Checkmarx CxEnterprise
CxQuery API Guide

V9.2.0

November, 2019

Table of Contents

1 PREFACE 6

2 INTRODUCTION 7

2.1 DEFINITIONS 7
2.2 QUERIES AND COMMANDS: 8
2.2.1 Data Flow Graph 9

3 USING CXLOG 10

4 USING CXENV 11

5 METHODS DOCUMENTATION 12

5.1 CXLIST.NEWCXLIST METHOD () 12
5.2 CXLIST.ADD METHOD (INT, IGRAPH) 12
5.3 CXLIST.ADD METHOD (CXLIST) 13
5.4 CXLIST.ADD METHOD (KEYVALUEPAIR<INT, IGRAPH>) 14
5.5 CXLIST.ADDRANGE METHOD (IENUMERABLE<CXLIST>) 14
5.6 CXLIST.ADD METHOD (PARAMS CXLIST[]) 15
5.7 CXLIST.CALLINGMETHODOFANY METHOD (CXLIST) 16
5.8 CXLIST.CLEAR METHOD () 16
5.9 CXLIST CONCATENATE METHODS 17
5.9.1 CxList.Concatenate Method (CxList list, bool _testFlow) 17
5.9.2 CxList.Concatenate Method (CxList list) 18
5.9.3 CxList.ConcatenatePath Method (CxList list, bool _testFlow) 18
5.9.4 CxList.ConcatenatePath Method (CxList list) 19
5.9.5 CxList.ConcatenateAllPaths Method (CxList list, bool _testFlow) 20
5.9.6 CxList.ConcatenateAllPaths Method (CxList list) 21
5.9.7 CxList.ConcatenateAllSources Method (CxList list) 21
5.9.8 CxList.ConcatenateAllSources Method (CxList list, bool testFlow) 22
5.9.9 CxList.ConcatenateAllTargets Method (CxList list) 23
5.9.10 CxList.ConcatenateAllTargets Method (CxList list, bool testFlow) 24
5.10 CXLIST.CONTAINED METHOD (CXLIST, GETSTARTENDNODESTYPE) 25
5.11 CXLIST.CXSELECTDOMPROPERTY<T> METHOD (FUNC<T,IGRAPH) WHERE T : CSHARPGRAPH 26
5.12 CXLIST.CXSELECTELEMENTS<T> METHOD (FUNC<T,IGRAPH, OPTION) WHERE T : CSHARPGRAPH 27
5.13 CXLIST.CXSELECTELEMENTSVALUES<T,I>(FUNC<T,I>) WHERE: T : CSHARPGRAPH 29
5.14 CXLIST.EXTRACTFROMSOQL METHOD () 30
5.15 CXLIST.EXTRACTFROMSOQL METHOD (STRING) 31
5.16 CXLIST.DATAINFLUENCEDBY METHOD (CXLIST) 31
5.17 CXLIST.DATAINFLUENCEDBY METHOD (CXLIST, INFLUENCEALGORITHMCALCULATION) 32
5.18 CXLIST.DATAINFLUENCINGON METHOD (CXLIST) 33
5.19 CXLIST.DATAINFLUENCINGON METHOD (CXLIST, INFLUENCEALGORITHMCALCULATION) 34
5.20 CXLIST.INFLUENCEDBY METHOD (CXLIST) 35
5.21 CXLIST.INFLUENCEDBY METHOD (CXLIST, INFLUENCEALGORITHMCALCULATION) 36
5.22 CXLIST.INFLUENCEDBYANDNOTSANITIZED METHOD (CXLIST, CXLIST) 37
5.23 CXLIST.INFLUENCEDBYANDNOTSANITIZED METHOD (CXLIST, CXLIST, INFLUENCEALGORITHMCALCULATION) 38
5.24 CXLIST.INFLUENCINGON METHOD (CXLIST) 39
5.25 CXLIST.INFLUENCINGON METHOD (CXLIST, INFLUENCEALGORITHMCALCULATION) 40
5.26 CXLIST.INFLUENCINGONANDNOTSANITIZED METHOD (CXLIST,CXLIST) 41
5.27 CXLIST.INFLUENCINGONANDNOTSANITIZED METHOD (CXLIST,CXLIST,INFLUENCEALGORITHMCALCULATION) 42
5.28 CXLIST.NOTINFLUENCEDBY METHOD (CXLIST) 43
5.29 CXLIST.NOTINFLUENCINGON METHOD (CXLIST) 44
5.30 CXLIST FILTER METHODS 45
5.30.1 CxList.GetDOMPropertiesOfFirst() 45
5.30.2 CxList.Filter(Func<DOMProperties,bool) 46
5.30.3 CxList.FilterByDomProperty<T> Method (Func<T, bool>) where T:CSharpGraph 47
5.31 CXLIST.FINDALLMEMBERS METHOD (CXLIST) 48
5.32 CXLIST.FINDALLREFERENCES METHOD (CXLIST) 48
5.33 CXLIST.FINDALLREFERENCES METHOD (CXLIST, CXLIST) 49
5.34 CXLIST.FINDBYASSIGNMENTSIDE METHOD (ASSIGNMENTSIDE) 50
5.35 CXLIST.FINDBYCUSTOMATTRIBUTE METHOD (STRING) 51
5.36 CXLIST.FINDBYEXTENDEDTYPE METHOD (STRING) 52
5.37 CXLIST.FINDBYFATHERS METHOD (CXLIST) 52
5.38 CXLIST.FINDBYFIELDATTRIBUTES METHOD (MODIFIERS) 53
5.39 CXLIST.FINDBYFILENAME METHOD (STRING) 54
5.40 CXLIST.FINDBYID METHOD (INT) 55
5.41 CXLIST.FINDBYINITIALIZATION METHOD (CXLIST) 56
5.42 CXLIST.FINDBYLANGUAGE METHOD (STRING) 56

5.43 CxList.FindByMemberAccess Method (string) 57
5.44 CxList.FindByMemberAccess Method (string,bool) 58
5.45 CxList.FindByMemberAccess Method (string,string) 59
5.46 CxList.FindByMemberAccess Method (string, string, bool) 60
5.47 CxList.FindByMemberAccesses Method (string[],bool) 61
5.48 CxList.FindByExactMemberAccess Method (string) 62
5.49 CxList.FindByExactMemberAccess Method (string,bool) 63
5.50 CxList.FindByExactMemberAccess Method (string,string) 64
5.51 CxList.FindByExactMemberAccess Method (string, string, bool) 65
5.52 CxList.FindByMethodReturnType Method (string) 65
5.53 CxList.FindByName Method (string) 66
5.54 CxList.FindByName Method (string, int, int) 67
5.55 CxList.FindByName Method (string, bool) 68
5.56 CxList.FindByName Method (string, StringComparison) 69
5.57 CxList.FindByName Method (CxList) 69
5.58 CxList.FindByName Method (CxList, bool) 70
5.59 CxList.FindByParameterName(string) 71
5.60 CxList.FindByParameterName(string, int) 72
5.61 CxList.FindByParameters Method (CxList) 73
5.62 CxList.FindByParameterValue Method (int, string, BinaryOperator) 74
5.63 CxList.FindByParameterValue Method (int, string, BinaryOperator, bool) 75
5.64 CxList.FindByParameterValue Method (int, int, BinaryOperator) 76
5.65 CxList.FindByPointerType Method (string, int, bool) 76
5.66 CxList.FindByPointerType Method (string, bool) 77
5.67 CxList.FindByPointerTypes Method (string[], int, bool) 78
5.68 CxList.FindByPointerTypes Method (string[], bool) 79
5.69 CxList.FindByPosition Method (int) 80
5.70 CxList.FindByPosition Method (int, int) 81
5.71 CxList.FindByPosition Method (int, int, int) 81
5.72 CxList.FindByPosition Method (string, int) 82
5.73 CxList.FindByPosition Method (string, int, int) 83
5.74 CxList.FindByPositions Methods 84
5.74.1 CxList.FindByPositions Method (SortedList, int, bool) 84
5.74.2 CxList.FindByPositions Method (CxList, CxPositionProximity, bool) 85
5.74.3 CxList.FindByPositions Method (SortedList<LinePragma,object>, CxPositionProximity, bool) 86
5.74.4 CxList.FindByPositions Method (SortedList<LinePragma,object>, CxPositionProximity, bool, int) 87
5.74.5 CxList.FindByPositions Method (List<KeyValuePair<int, string>>) 88
5.75 CxList.FindByRegex Methods 89
5.75.1 CxList.FindByRegex Method (string) 90
5.75.2 CxList.FindByRegex Method (string, bool, bool, bool) 91
5.75.3 CxList.FindByRegex Method (string, bool, bool, bool, CxList) 92
5.75.4 CxList.FindByRegex Method (string, CxList) 94
5.75.5 CxList.FindByRegex Method (string, CxRegexOptions) 95
5.75.6 CxList.FindByRegex Method (string, CxRegexOptions, CxList) 96
5.75.7 CxList.FindByRegex Method (string, CxRegexOptions, RegexOptions) 97
5.75.8 CxList.FindByRegex Method (string, CxRegexOptions, RegexOptions, CxList) 98
5.75.9 CxList.FindByRegex Method (string, CxRegexOptions, RegexOptions, CxList, int, CxPositionSearchDirection) . 99
5.75.10 CxList.FindByRegexSecondOrder Method (string, CxList) 101
5.76 CxList.FindByRegexExt Methods 102
5.76.1 CxList.FindByRegexExt Method (string) 102
5.76.2 CxList.FindByRegexExt Method (string, string) 103
5.76.3 CxList.FindByRegexExt Method (string, string, bool) 103
5.76.4 CxList.FindByRegexExt Method (string, string, bool, RegexOptions) 104
5.76.5 CxList.FindByRegexExt Method (string, string, bool, CxRegexOptions ,RegexOptions) 105
5.76.6 CxList.FindByRegexExt Method (string, string, CxRegexOptions) 106
5.76.7 CxList.FindByRegexExt Method (string, string, CxRegexOptions, RegexOptions) 107
5.76.8 CxList.FindByRegexExt Method (string, List<string>, bool, CxRegexOptions, RegexOptions) 109
5.77 CxList.FindByReturnType Method (string) 110
5.78 CxList.FindByShortName Method (string) 111
5.79 CxList.FindByShortName Method (string, bool) 111
5.80 CxList.FindByShortNames Method (List<string>) 112
5.81 CxList.FindByShortNames Method (List<string>, bool) 113
5.82 CxList.FindByShortName Method (CxList) 114
5.83 CxList.FindByShortName Method (CxList, bool) 115
5.84 CxList.FindByTypeModifiers Method (TypeSignednessModifiers, TypeSizeModifiers) 116
5.85 CxList.FindByTypeModifiers Method (TypeSignednessModifiers) 117
5.86 CxList.FindByTypeModifiers Method (TypeSizeModifiers) 118
5.87 CxList.FindByType Method (Type) 119
5.88 CxList.FindByType Method (string) 120
5.89 CxList.FindByType Method (string, bool) 120
5.90 CxList.FindByTypes Method (string[]) 121

5.91 CxList.FindByTypes Method (string[], bool) 122
5.92 CxList.FindDefinition Method (CxList) 123
5.93 CxList.FindInitialization Method (CxList) 124
5.94 CxList.FindInScope Method (CxList, CxList) 125
5.95 CxList.FindSubList Method (int, bool) 125
5.96 CxList.GetAncOfType Method (Type) 126
5.97 CxList.GetArrayOfNodeIds Method () 127
5.98 CxList.GetBlocksOfIfStatements Method (bool) 128
5.99 CxList.GetBlocksOfIterationStatements Method () 129
5.100 CxList.GetBranchesOfTernaryExpressions Method (bool) 130
5.101 CxList.GetByAncs Method (CxList) 131
5.102 CxList.GetByBinaryOperator Method (BinaryOperator) 132
5.103 CxList.GetByClass Method (CxList) 132
5.104 CxList.GetByMethod Method (CxList) 133
5.105 CxList.GetClass Method (CxList) 134
5.106 CxList.GetCxListByPath Method () 135
5.107 CxList.GetEnumerator Method () 136
5.108 CxList.GetFathers Method () 138
5.109 CxList.GetFinallyClause Method (CxList) 139
5.110 CxList.GetFirstGraph Method () 139
5.111 CxList.GetFollowingStatements Method () 140
5.112 CxList.GetMembersOfTarget Method () 141
5.113 CxList GetRightmostMember() 142
5.114 CxList GetLeftmostTarget() 143
5.115 CxList.GetMembersWithTargets Method () 143
5.116 CxList.GetMembersWithTargets Method (CxList) 144
5.117 CxList.GetMembersWithTargets Method (CxList, int) 145
5.118 CxList.GetMethod Method (CxList) 146
5.119 CxList.GetName Method () 147
5.120 CxList.GetParameters Method (CxList) 147
5.121 CxList.GetParameters Method (CxList, int) 148
5.122 CxList.GetPathsOrigins Method () 149
5.123 CxList.GetStartAndEndNodes Method (GetStartEndNodesType) 150
5.124 CxList.GetTargetOfMembers Method () 151
5.125 CxList.GetTargetsWithMembers Method () 152
5.126 CxList.GetTargetsWithMembers Method (CxList) 152
5.127 CxList.GetTargetsWithMembers Method (CxList, int) 153
5.128 CxList.InheritsFrom Method (string) 154
5.129 CxList.InheritsFrom Method (CxList) 155
5.130 CxList.IntersectWithNodes Method (CxList) 156
5.131 CxList.IntersectWithNodes Method (CxList, CxList.IntersectionType) 157
5.132 CxList.ReduceFlow Method (CxList.ReduceFlowType) 158
5.133 CxList.ReduceFlowByPragma Method () 159
5.134 CxList.SanitizeCxList Method (CxList sanitizeNodes) 160
5.135 CxList.FillGraphsList Method (CxList) 161
5.136 CxList.FillGraphsList Method (CSharpGraph) 161
5.137 CxList.GetIndexOfParameter Method () 162
5.138 CxList.FindSQLInjections Method (CxList, CxList, CxList) 163
5.139 CxList.FindXSS Method (CxList, CxList, CxList) 163
5.140 CxList.Clone Method () 164
5.141 CxList.TryGetCSharpGraph<T> Method () where T : CSharpGraph 164
5.142 CxList.GetQueryParam Method (string paramName) 165
5.143 CxList.GetQueryParam<T> Method (string paramName, T defaultVal = default(T)) 166
5.144 CxList.FindByFiles Method (CxList source) 166
5.145 CxList.FindRegexMatches Method (CxList comments) 167
5.146 CxList.GetAssigner Method (CxList others = null) 168
5.147 CxList.GetAssignee Method (CxList others = null) 169
5.148 CxList Abstract Interpretation Methods 169
5.148.1 CxList.FindByAbstractValue Method (Func<IAbstractValue, bool> criterion) 170
5.148.2 CxList.FindByAbstractValues Method (CxList sources) 172
5.149 Scan Provider Methods 173
5.149.1 cxScan.IsFrameworkActive Method (string frameworkName) 173
5.149.2 cxScan.GetScanProperty Method (string key) 174
5.150 CxList CxXPath Methods 174
5.150.1 IEnumerable<CxXmlDoc> GetXmlFiles Method (string filter, bool IgnoreNamespaces = false) 174
5.150.2 CxList CreateXmlNode Method (XPathNavigator input, CxXmlDoc xmlDoc, int language, bool save, int depth = 1) 175
5.150.3 CxList FindXmlNodesByQualifiedName Method (string xmlFilterFiles, int language, string prefix, string nodeName, bool includeAttributes, string attributeName = "", string attributeValue = "", bool usesRegex = false, bool ignoreCase = false) 176

5.150.4 CxList FindXmlNodesByQualifiedNameAndValue Method (string xmlFilterFiles, int language, string prefix, string nodeName, string nodeValue, bool usesRegexForNodeValue = false, bool ignoreCase = false) *177*
5.150.5 CxList FindXmlNodesByLocalName Method (string xmlFilterFiles, int language, string nodeName, bool includeAttributes = false, string attributeName = "", string attributeValue = "", bool usesRegex = false, bool ignoreCase = false) *178*
5.150.6 CxList FindXmlNodesByLocalNameAndValue Method (string xmlFilterFiles, int language, string nodeName, string nodeValue, bool usesRegexForNodeValue = false, bool ignoreCase = false) *179*
5.150.7 CxList FindXmlAttributesByName Method (string xmlFilterFiles, int language, string attributeName, bool ignoreCase = false) *180*
5.150.8 CxList FindXmlAttributesByValue Method (string xmlFilterFiles, int language, string attributeValue, bool usesRegex = false) *181*
5.150.9 CxList FindXmlAttributesByNameAndValue Method (string xmlFilterFiles, int language, string attributeName, string attributeValue, bool usesRegex = false, bool ignoreCase = false) *182*
5.150.10 Void AddSupportForExpressionLanguageForFramework (string framework) *183*
5.150.11 public CxList FindAllAttributesThatHoldExpressions(string xmlFilterFiles, int language, string framework) ... *183*
5.150.12 public CxList GetTextNodesExpressions(string xmlFilterFiles, string framework, int language) *184*
5.150.13 public CxList createAttributesDefinition(string xmlFilterFiles, int language, string framework) *185*
5.150.14 public CxList GetXMLNodeDescendents(CxList originNodes, CxList descendentExpressionGroup) *185*
5.150.15 public CxList GetAllExpressionDescendents(CxList descendentExpressionGroup, int language) *186*
5.150.16 public CxList GetElementOfCreatedDeclaration(CxList declarations) *187*
5.150.17 public CxList GetAttributeByExpression(CxList expression) *188*
5.150.18 public CxList GetExpressionsByAttributes(CxList attributes) *188*
5.150.19 public CxList GetElementByExpression(CxList expressions) *189*
5.150.20 public CxList CreateIterationVarDefinition(string xmlFilterFiles, int language, string framework) *190*
5.151 CxList CxJson Methods 191
5.151.1 CxList FindJsonPropertyByName Method (string filesFilter, int language, string name, bool usesRegex = false, bool ignoreCase = false) *191*
5.151.2 CxList FindJsonPropertyByValue Method (string filesFilter, int language, string value, bool usesRegex = false, bool ignoreCase = false) *192*
5.151.3 CxList FindJsonPropertyByNameAndValue Method (string filesFilter, int language, string name, string value, bool usesRegex = false, bool ignoreCase = false) *193*

6 METHOD DOCUMENTATION (FOR INTERNAL USE ONLY) 194

6.1 CxList.SetQueryProperty Method (QueryProperties.propertyEnum, QueryProperties.flowDirectionEnum) 194
6.2 CxList.GetSanitizerByMethodInCondition Method (CxList) 194
6.3 CxList.GetSanitizerByMethodInCondition Method (CxList, IfBlock) 195

7 CXLIST OPERATORS 197

8 CXQUERY MISCELLANEOUS METHODS 198

8.1 cxLog.WriteDebugMessage Method (string) 198

9 APPENDIX A. CXDOM TYPES 199

1 Preface

The CxQuery API Guide documents the Checkmarx Query Language (CxQL) used in CxAudit to query source code.

CxQL allows us to virtually data-mine any aspect of the source, and to build custom queries.

Checkmarx-provided queries are written using the CxQL.

These queries can be inherited, expanded, or rewritten.

Note: CxQL queries are language-dependent.

2 Introduction

A query written in Checkmarx Query Language allows us to analyze the scanned code and return a list of results.

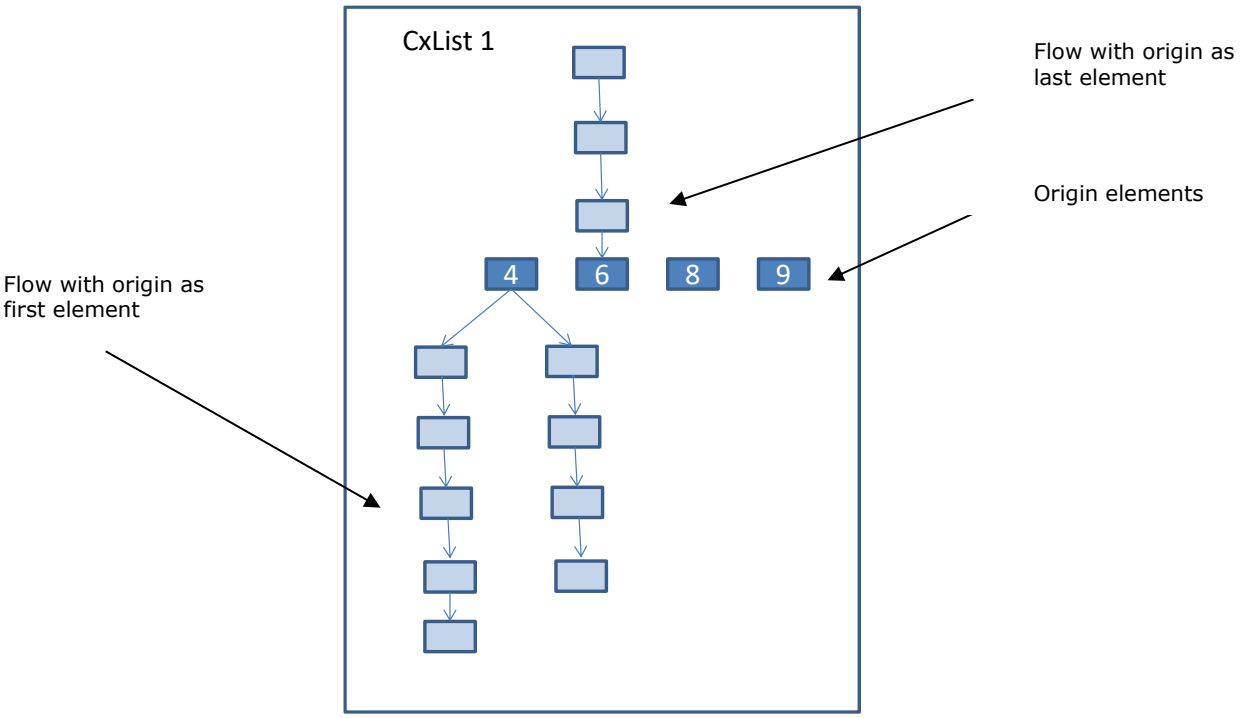
Each result can be an element in the scanned code (e.g. a variable) or a "flow" – a path in the code consisting of an ordered list of these elements.

2.1 Definitions

Basic code element – Code elements such as variables, method invocations and assignments that have representation in the code model.

Data flow (flow) – an ordered list of code elements that represent a possible data change progression in the program from a certain location where the data has changed and the end location where that change had an affect (as a subsequent data change).
Every flow is attached to an origin basic code element. This origin element may be the first or last code element in the flow. The origin element appears as the first element in the flow if that element was queried as to whether it influenced other elements. The origin element appears as the last element in the flow if that element was queried as to whether it was influenced by other elements.

CxList - the central data type in CxQL. The CxList is a list that consists of basic code elements such as variables, method invocations, assignments, and so forth. Each element may have an attached flow, if the element was added to the CxList because it fulfilled a certain flow query.



There are two special CxList objects by default:

All – contains all elements in the scanned code, and

result – the return value of the query.

Notes:

- "All" contains only basic code elements (without any flow).
- To create a new empty CxList use All.NewCxList().

2.2 Queries and Commands:

Now we are ready for our first query:

```
CxQL

 This example demonstrates the use of "All" and "result" objects
result = All;

 This would return a list of all objects in the code for a specific language
```

CxList includes a vast assortment of commands. In the following example, we investigate the CxList FindByName command:

```
CxQL

result = All.FindByName("*MyName*")
 This would return a list of all objects where their name
 contains the string "MyName".

 It is the same as:
CxList cml = All.FindByName("*MyName*");
result = cml;
```

Because the return value of almost every command is also of type CxList, several commands can be executed consecutively as shown in the example below.

It is important to note that most CxList methods return a subset of the original CxList (we can think of the method as a **filter**).

So in the example below, consisting of chained method calls:

```
All.FindByName("*.MyName").FindByType (typeof(MemberAccess))
```

The order of execution is:

1. Return a CxList consisting of a subset of "All" (all elements in code) with name containing MyName .
2. Return a subset of the previous result , only those of type MemberAccess.

```
CxQL

result = All.FindByName("*.MyName").FindByType (typeof(MemberAccess));
 This would return a list of all access data members in the code whose name
contains the string "MyName" (e.g. a = b.MyName ).
 First we find all objects whose name ends with ".MyName", and on the result we
execute another command that retrieves only access members.
 This is the same as the following:

result = All.FindByType (typeof(MemberAccess)).FindByName("*.MyName");
* The difference is in efficiency. We want to work on the smallest groups
possible, so actually first looking by name and then by type should be more
efficient.
```

While the result in both cases is identical (order of filtering doesn't matter), the choice of execution order can have a noticeable effect on performance.

2.2.1 Data Flow Graph

We have seen in the previous section several commands that can operate on CxList objects. All the commands were “static” since they locate elements in the code, but they do not capture the flow between elements. The Data Flow Graph (DFG) in Source Code Analysis (SCA) describes how data is flowed through the program. Object A is "data influenced by" object B if the value of B flows to A.

In the example below, **d** is "data influenced by" **a** and **b**, but not by **c**. This means that both **a** and **b** are "data influencing on" **d**, but not on **c**.

```
C#

a = 5;
b = 6;
c = 7;
d = a + b;
```

3 Using cxLog

The cxlog object is a way to output debug messages from within a query, in the CxAudit environment.

The messages can be seen in the CxAudit bottom window, in the tab named "Debug Messages".

The most common case is when exceptions happen, so that the exception details can be viewed after the query has finished.

For example:

```
CXQL
foreach (CxList rt in redirectThings)
{
	try
	{
		[…]
	}
	catch (Exception ex)
	{
		// in case of an exception in the loop
		cxLog.WriteDebugMessage(ex);
	}
}
```

It can also be used for more detailed inspection of the query behavior from within the query itself.

For example:

```
CXQL
if(hexEquiv != "")
{
	cxLog.WriteDebugMessage("hexEquiv=" + hexEquiv + ", #finds=" +
finds.Count);
	count++;
}
else
{
	cxLog.WriteDebugMessage("hexEquiv=empty" + hexEquiv + ", #finds=" +
finds.Count);
}
```

Note that cxLog.WriteDebugMessage cannot display CxList data directly. Executing that **cxLog.WriteDebugMessage(myCxList)** will yield just an integer value.

However, in many cases (when the CxList does not represent a path), one can retrieve and output the CxList element fields.

For example:

```
CXQL
CxList inputs = Find_Inputs();
foreach (CxList inp in inputs)
{
	CSharpGraph inp_Graph = inp.data.GetByIndex(0) as CSharpGraph;
	String inp_Name = inp_Graph.ShortName;
	cxLog.WriteDebugMessage("Name = " + inp_Name);
}
```

4 Using cxEnv

The cxEnv object is a way to allow access using System.IO API for environment variables within a query, in the CxAudit environment.

Since there are many differences between, for instance, Windows and Linux, this cxEnv will determine automatically your OS and, therefore, output the correct result.

There are several possibilities to find environment variables such as File line termination, Path separator, Directory separator, Volume separator and.

For example:

```
CXQL
const string JS_EXT = ".js";
char PATH_SEP = cxEnv.DirectorySeparatorChar;
char vSeparator = cxEnv.VolumeSeparatorChar;
string controllerPath = directory + vSeparator + PATH_SEP + onlyName + PATH_SEP
+ JS_EXT;
```

In the above example, instead of declaring const string PATH_SEP = "\\", it is possible to invoke the correct method that returns the desired output. Additionally, it's conceivable as well to declare the volume separator as cxEnv.VolumeSeparatorChar as an alternative for const string vSeparator = ":".

The controllerPath output will be, for example, C:\Users\User\Documents\Tests\Test.js
where C match directory variable, : is the representation for vSeparator, \ match PATH_SEP, onlyName represents already a combined path for the directory and, finaly, JS_EXT substitute .js type.
If the above example was running on a Linux machine, the output could be, for instance, /home/User/Documents/Tests/Test.js

For each possible environment variable, regarding different OS, we can have the following outputs:

- **cxEnv.NewLine** - Gets the newline string defined for the environment.
  Important remark: the property value of NewLine is a constant customized specifically for the current platform and implementation of the .NET Framework.
- **cxEnv.Path.PathSeparator** - On Windows-based desktop platforms, the value of this field is a semicolon (;) by default, but might vary on other platforms;
- **cxEnv.Path.DirectorySeparatorChar** - On Windows, the directory separator is \. On UNIX is /
- **cxEnv.Path.VolumeSeparatorChar** - The value of this field is a colon (:) on Windows and Macintosh, and a slash (/) on UNIX operating systems. This is most useful for parsing paths such as "c:\windows" or "MacVolume:System Folder";
- **cxEnv.Path.Combine()** - If necessary, use Directory separator or method Combine. This method is intended to concatenate individual strings into a single string that represents a file path.

Note that this new API was created similarly to the .NET **System** package. As such, the cxEnv.Path correlates to the **System.IO.Path** package and all its properties are devired directly. Only the cxEnv.NewLine differs from the previous ones since it devires from **System.Environment** package.

5 Methods Documentation

5.1 CxList.NewCxList Method ()

Create new empty CxList.

Syntax

```
CxQL
public CxList NewCxList()
```

Parameters

N/A

Exceptions

Exception type	Condition
ArgumentNullException	**parameter is a null reference**

Example

```
CxQL

 This example demonstrates the CxList.NewCxlist() method.
 The input source code is:

int b, a = 5;
 if (a == 33)
      b = 6;

CxList list_a = All.NewCxList();
list_a.Add(All.FindByName("A"));
CxList list_b = All.FindByName("b");
list_a.Add(list_b);
result = list_a;
 The resulting list will contain 4 elements
```

5.2 CxList.Add Method (int, IGraph)

Adds to the current instance the given graph node, indexed by the given id.

Syntax

```
CxQL
public void Add(int id, IGraph node)
```

Parameters

Id

Id of the node to be added to the graph node.

Node

Graph node to be associated to the given Id.

Exceptions

Exception type	Condition
ArgumentNullException	parameter is a null reference

Example

```
CxQL

 This example demonstrates the CxList.Add() method.
 The input source code is:

 int b, a = 5;
 if (a == 33)
      b = 6;

CxList myList = All.FindByName("a");
CSharpGraph nodeGraph = All.FindByName("b").GetFirstGraph();
myList.Add(nodeGraph.NodeId, nodeGraph);
result = myList;
   The resulting list will include the initial two "a"'s and the first b
```

5.3 CxList.Add Method (CxList)

Add all the elements from the given CxList to the current instance.

Syntax

```
CxQL
public void Add(CxList list)
```

Parameters

list

The CxList to be added to the current CxList instance.

Exceptions

Exception type	Condition
ArgumentNullException	**parameter is a null reference**

Example

```
CxQL

 This example demonstrates the CxList.Add() method.
 The input source code is:

 int b, a = 5;
 if (a == 33)
      b = 6;

CxList list_a = All.FindByName("a");
CxList list_b = All.FindByName("b");
list_a.Add(list_b);
result = list_a;
 The resulting list will contain 4 elements
```

5.4 CxList.Add Method (KeyValuePair<int, IGraph>)

Add the given pair to the current CxList instance.

Syntax

```
CxQL
public void Add(KeyValuePair<int, IGraph> dictionary)
```

Parameters

dictionary

Pair to be added to the current CxList instance.

Exceptions

Exception type	Condition
ArgumentNullException	**parameter is a null reference**

Example

```
CxQL

 This example demonstrates the CxList.Add() method.
 The input source code is:

int b, a = 5;
 if (a == 33)
      b = 6;

CxList myList = All.FindByName("a");
foreach(KeyValuePair<int,IGraph> entry in All.FindByName("b"))
{
       myList.Add(entry);
}
result = myList;
 The resulting list will contain 4 elements
```

5.5 CxList.AddRange Method (IEnumerable<CxList>)

Adds to the current instance all the elements from the given CxLists.

Syntax

```
CxQL
public void Add(IEnumerable<CxList> lists)
```

Parameters

lists

A list of CxLists

Exceptions

Exception type	Condition
ArgumentNullException	parameter is a null reference

Example

```
CxQL
```

```
This example demonstrates the CxList.AddRange(IEnumerable<CxList>) method.
The input source code is:

int b, a = 5;
if (a == 33)
     b = 6;

CxList a = All.FindByName("a");
CxList b = All.FindByName("b");
CxList integers = All.FindByType(typeof(IntegerLiteral));
Result.AddRange(new List<CxList>(){a, b, integers});
   The resulting list will include the two "a"'s, two "b"'s and the numbers 5,
33, 6.
```

Version Information

Supported from 9.1.0

5.6 CxList.Add Method (params CxList[])

Adds to the current instance all the elements from the given CxLists.

Syntax

```
CxQL
public void Add(params CxList[] lists)
```

Parameters

lists

An array of CxLists

Exceptions

Exception type	Condition
ArgumentNullException	parameter is a null reference

Example

```
CxQL

This example demonstrates the CxList.Add(params CxList[]) method.
The input source code is:

int b, a = 5;
if (a == 33)
     b = 6;

CxList a = All.FindByName("a");
CxList b = All.FindByName("b");
CxList integers = All.FindByType(typeof(IntegerLiteral));
Result.Add(a, b, integers);
   The resulting list will include the two "a"'s, two "b"'s and the numbers 5,
33, 6.
```

Version Information

Supported from 9.1.0

5.7 CxList.CallingMethodOfAny Method (CxList)

Returns a CxList which is a subset of "this" instance and are methods or constructors declarations which matches the given CxList elements.

Syntax

```
CxQL
public CxList CallingMethodOfAny(CxList elements)
```

Parameters

elements

The list of elements containing the methods or constructors to look for their declaration.

Return Value

The methods or constructor declarations which matches the given CxList elements.

Example

```
CxQL

 This example demonstrates the CxList.CallingMethodOfAny() method.
 The input source code is:
 void foo()
 {
      int goo = 3;
      int boo = 5;
 }

result = All.CallingMethodOfAny(All.FindByName ("oo"));

 The result would consist of 1 item:
      foo (in void foo())
```

5.8 CxList.Clear Method ()

Clears the information in "this" instance.

Syntax

```
CxQL
public bool Clear()
```

Parameters

None

Return Value

None

Comments

This method removes all the information stored in the List.

Example

```
CxQL

 This example demonstrates the CxList.Clear() method.

CxList MyList = All;
MessageBox.Show(MyList.Count.ToString());

MyList.Clear();
```

```
MessageBox.Show(MyList.Count.ToString());
```

5.9 CxList Concatenate Methods

5.9.1 CxList.Concatenate Method (CxList list, bool _testFlow)

Concatenates two nodes into a flow.

Syntax

```
CxQL
public CxList Concatenate (CxList list, bool _testFlow)
```

Parameters

list

A CxList containing one node only. This node will be concatenated to **this** instance

_testFlow

If true, searches for a flow between **this** instance and **list**. Otherwise, connects the two nodes directly (more efficient).

Return Value

A flow that starts with **this** instance node, and ends with the **list** parameter node.

Exceptions

Exception type	Condition
ArgumentNullException	**parameter is a null reference**

Remarks

1. If either **this** instance or **list** parameter contains more than one node or contains flows, the function return value is undefined.
2. This function is deprecated, use **ConcatenatePath** instead.

Example

The following code example shows how you can use the Concatenate method.

```
CxQL

void main()
{
	int a = 1;
	int b = 2;
	int c = a + b;
	printf("%d", c);
}

CxList one = All.FindByName("1");
CxList two = All.FindByName("2");
result = one.Concatenate(two);

 the result would be -
      1 flow found:
            [1] -> [2]
```

Version Information

Supported from v7.1.2

5.9.2 CxList.Concatenate Method (CxList list)

Concatenates two nodes into a flow.

Syntax

```
CxQL
public CxList Concatenate (CxList list)
```

Parameters

list

A CxList containing one node only. This node will be concatenated to **this** instance

Return Value

A flow that starts with **this** instance node, and ends with the **list** parameter node.

Exceptions

Exception type	Condition
ArgumentNullException	**parameter is a null reference**

Remarks

1. This function calls CxList.Concatenate(list, false).
2. If either this instance or list parameter contains more than one node or contains flows, the function return value is undefined.
3. This function is deprecated, use ConcatenatePath instead.

Version Information

Supported from v7.1.2

5.9.3 CxList.ConcatenatePath Method (CxList list, bool _testFlow)

Concatenates two flows into one connected flow.

Syntax

```
CxQL
public CxList ConcatenatePath (CxList list, bool _testFlow)
```

Parameters

list

A CxList containing one flow only. This flow will be concatenated to **this** instance

_testFlow

If true, searches for a flow between **this** instance and **list**. Otherwise, connects the two flows directly (more efficient).

Return Value

A flow that starts with **this** instance flow, and ends with the **list** parameter flow.

Exceptions

Exception type	Condition
ArgumentNullException	**parameter is a null reference**

Remarks

Both **this** instance and **list** have to contain only one flow (or one node as a private case), otherwise return value is undefined.

Example

The following code example shows how you can use the ConcatenatePath method.

```
CxQL

void main()
{
       int a = 1;
       int b = 2;
}

CxList one = All.FindByName("1");
CxList a = All.FindByShortName("a").FindByType(typeof(Declarator)); //Declarator
is a new type defined in cXQL
CxList flow1 = a.InfluencedBy(one); // [1] -> [a]

CxList two = All.FindByName("2");
CxList b = All.FindByShortName("b").FindByType(typeof(Declarator));
CxList flow2 = b.InfluencedBy(two); // [2] -> [b]

result = flow2.ConcatenatePath(flow1);

 the result would be -
     1 flow found:
           [2] -> [b] -> [1] -> [a]
```

Version Information

Supported from v7.1.2

5.9.4 CxList.ConcatenatePath Method (CxList list)

Concatenates two flows into one connected flow.

Syntax

```
CxQL
public CxList ConcatenatePath (CxList list)
```

Parameters

list

A CxList containing one flow only. This flow will be concatenated to **this** instance

Return Value

A flow that starts with **this** instance flow, and ends with the **list** parameter flow.

Exceptions

Exception type	Condition
ArgumentNullException	**parameter is a null reference**

Remarks

1. This function calls CxList.ConcatenatePath(list, true).
2. Both this instance and list have to contain only one flow (or one node as a private case), otherwise return value is undefined.

Version Information

Supported from v7.1.2

5.9.5 CxList.ConcatenateAllPaths Method (CxList list, bool _testFlow)

Concatenates all flows in this instance to all flows in **list**.

Syntax

```
CxQL
public CxList ConcatenateAllPaths (CxList list, bool _testFlow)
```

Parameters

list

A CxList containing flows. These flow will be concatenated to the flows in **this** instance

_testFlow

If true, searches for a flow between **this** instance and **list**. Otherwise, connects the two flows directly (more efficient).

Return Value

A product of all flows in **this** instance with the ones in **list** parameter.

Exceptions

Exception type	Condition
ArgumentNullException	**parameter is a null reference**

Remarks

If **this** instance contains ***n*** flows in it and **list** contains ***m*** flows in it, the return set will contain ***nxm*** flows, where each flow from **this** instance will be concatenated to each flow from **list**.

Example

The following code example shows how you can use the ConcatenateAllPaths method.

```
CxQL

void main()
{
       int a = 1;
       int b = 2;
}

CxList one = All.FindByName("1");
CxList a = All.FindByShortName("a").FindByType(typeof(Declarator));
CxList flow1 = a.InfluencedBy(one); // [1] -> [a]
CxList two = All.FindByName("2");
CxList b = All.FindByShortName("b").FindByType(typeof(Declarator));
CxList flow2 = b.InfluencedBy(two); // [2] -> [b]
CxList flow = flow1 + flow2;
result = flow.ConcatenateAllPaths(flow);
 the result would be -
      4 flow found:
            [1] -> [a] -> [1] -> [a]
              [1] -> [a] -> [2] -> [b]
              [2] -> [b] -> [1] -> [a]
              [2] -> [b] -> [2] -> [b]
```

Version Information

Supported from v7.1.2

5.9.6 CxList.ConcatenateAllPaths Method (CxList list)

Concatenates all flows in this instance to all flows in **list**.

Syntax

```
CxQL
public CxList ConcatenateAllPaths (CxList list)
```

Parameters

list

A CxList containing flows. These flow will be concatenated to the flows in **this** instance

Return Value

A product of all flows in **this** instance with the ones in **list** parameter.

Exceptions

Exception type	Condition
ArgumentNullException	**parameter is a null reference**

Remarks

1. This function calls CxList.ConcatenateAllPaths(list, true).
2. If this instance contains *n* flows in it and list contains *m* flows in it, the return set will contain *nxm* flows, where each flow from this instance will be concatenated to each flow from list.

Version Information

Supported from v7.1.2

5.9.7 CxList.ConcatenateAllSources Method (CxList list)

Concatenates the node in **list** to each node in **this** instance. Concatenation is node-to-node (doesn't support connecting flows).
Note: Currently is identical to calling ConcatenateAllSources with testFlow = false

Syntax

```
CxQL
public CxList ConcatenateAllSources (CxList list)
```

Parameters

list

A CxList. It will be concatenated to each node in this instance

Return Value

Flows that starts with **this** instance nodes, and end with the **list** parameter node.

Exceptions

Exception type	Condition
ArgumentNullException	**parameter is a null reference**

Remarks

1. If the **list** parameter contains more than one node or contains flows or **this** instance contains flows, the function return value is undefined.
2. The number of the returned items is same as the number of items in **this** instance.
3. This function calls the Concatenate function for each item in **this** instance with **list** as parameter.
4. Currently is identical to calling ConcatenateAllSources with testFlow = false

Example

The following code example shows how you can use the ConcatenateAllSources method.

```
CxQL

void main()
{
       int a = 1;
       int b = 2;
}

CxList a = All.FindByShortName("a").FindByType(typeof(Declarator));
CxList b = All.FindByShortName("b").FindByType(typeof(Declarator));
CxList main = All.FindByShortName("main");
CxList list = a + b;
result = list.ConcatenateAllSources(main);

 the result would be -
      2 flow found:
            [a] -> [main]
              [b] -> [main]
```

Version Information

Supported from v7.1.2

5.9.8 CxList.ConcatenateAllSources Method (CxList list, bool testFlow)

Concatenates the node in **list** to each node in **this** instance. Concatenation is node-to-node (doesn't support connecting flows).

Syntax

```
CxQL
public CxList ConcatenateAllSources (CxList list, bool testFlow)
```

Parameters

list

A CxList. It will be concatenated to each node in this instance

testFlow

If this parameter true -> test possible flow , otherwise connect directly

Return Value

Flows that starts with **this** instance nodes, and end with the **list** parameter node.

Exceptions

Exception type	Condition
ArgumentNullException	**parameter is a null reference**

Remarks

1. If the **list** parameter contains more than one node or contains flows or **this** instance contains flows, the function return value is undefined.
2. The number of the returned items is same as the number of items in **this** instance.
3. This function calls the Concatenate function for each item in **this** instance with **list** as parameter.

Example

The following code example shows how you can use the ConcatenateAllSources method.

```
CxQL

void main()
{
       int a = 1;
       int b = 2;
}

CxList a = All.FindByShortName("a").FindByType(typeof(Declarator));
CxList b = All.FindByShortName("b").FindByType(typeof(Declarator));
CxList main = All.FindByShortName("main");
CxList list = a + b;
result = list.ConcatenateAllSources(main, false);

 the result would be -
      2 flow found:
            [a] -> [main]
              [b] -> [main]
```

Version Information

Supported from v7.1.2

5.9.9 CxList.ConcatenateAllTargets Method (CxList list)

Concatenates each node in the **list** to the node in **this** instance. Concatenation is node-to-node (doesn't support connecting flows).

Syntax

```
CxQL
public CxList ConcatenateAllTargets (CxList list)
```

Parameters

list

A CxList. It will be concatenated to each node in this instance

Return Value

Flows that start with this instance nodes, and end with the **list** parameter node

Exceptions

Exception type	Condition
ArgumentNullException	**parameter is a null reference**

Remarks

1. If the "**this**" instance parameter contains more than one node or contains flows or **list** contains flows, the function return value is undefined.
2. The number of the returned items is same as the number of items in **list**.
3. This function calls the Concatenate function for **this** instance with each item in **list** as parameter..
4. Currently is identical to calling ConcatenateAllTargets with testFlow = false

Example

The following code example shows how you can use the ConcatenateAllSources method.

```
CxQL

void main()
{
       int a = 1;
       int b = 2;
```

```
}

CxList a = All.FindByShortName("a").FindByType(typeof(Declarator));
CxList b = All.FindByShortName("b").FindByType(typeof(Declarator));
CxList main = All.FindByShortName("main");
CxList list = a + b;
result = main.ConcatenateAllTargets(list);

 the result would be -
      2 flow found:
            [main] -> [a]
              [main] -> [b]
```

Version Information

Supported from v7.1.2

5.9.10 CxList.ConcatenateAllTargets Method (CxList list, bool testFlow)

Concatenates each node in the **list** to the node in **this** instance. Concatenation is node-to-node (doesn't support connecting flows).

Syntax

```
CxQL
public CxList ConcatenateAllTargets (CxList list, bool testFlow)
```

Parameters

list

A CxList. It will be concatenated to each node in this instance

testFlow

If this parameter true -> test possible flow , otherwise connect directly

Return Value

Flows that start with this instance nodes, and end with the **list** parameter node

Exceptions

Exception type	Condition
ArgumentNullException	**parameter is a null reference**

Remarks

1. If the "**this**" instance parameter contains more than one node or contains flows or **list** contains flows, the function return value is undefined.
2. The number of the returned items is same as the number of items in **list**.
3. This function calls the Concatenate function for **this** instance with each item in **list** as parameter..

Example

The following code example shows how you can use the ConcatenateAllSources method.

```
CxQL

void main()
{
       int a = 1;
       int b = 2;
}

CxList a = All.FindByShortName("a").FindByType(typeof(Declarator));
```

```
CxList b = All.FindByShortName("b").FindByType(typeof(Declarator));
CxList main = All.FindByShortName("main");
CxList list = a + b;
result = main.ConcatenateAllTargets(list, false);

 the result would be -
      2 flow found:
            [main] -> [a]
              [main] -> [b]
```

Version Information

Supported from v7.1.2

5.10 CxList.Contained Method (CxList, GetStartEndNodesType)

Returns a subset of "this" instance whose elements are contained in the given list, filtered according to the given nodes type.

Syntax

```
CxQL
public CxList Contained(CxList pathList, GetStartEndNodesType requestedType)
```

Parameters

pathList

The list where the method looks for the requested node type.

requestedType

An enum matching the relevant GetStartEndNodes types, which are:

EndNodesOnly, StartNodesOnly, StartAndEndNodes, AllNodes and AllButNotStartAndEnd

Return Value

A subset of "this" instance with elements from the requested nodes type.

Exceptions

Exception type	Condition
ArgumentNullException	**parameter is a null reference**

Comments

The return value may be empty (Count = 0).

Example

```
CxQL

 This example demonstrates the CxList.Contained() method.
 The input source code is:

 void foo()
{
       int b = 2, a = 5, c;
       if (a > b)
              b = 3;
       c = b;
}
```

```
result =
All.FindByShortName("b").Contained(All.InfluencedBy(All.FindById(50)),
CxList.GetStartEndNodesType.AllNodes); //Id 50 is "3" in "b = 3;"

 The result would consist of 2 items:
            b (from b = 3;)
            b (from c = b;)

result = All.FindByShortName("a").Contained(All.InfluencedBy(All.FindById(50)),
GetStartEndNodesType.EndNodesOnly); //Id 50 is "3" in "b = 3;"

 The result would consist of 0 items
```

5.11 CxList.CxSelectDomProperty<T> Method (Func<T,IGraph) where T : CSharpGraph

Returns a new CxList that includes selected property that exists in DOM type T and define by lambda. <T> is dom object type that this method get property from it. We can achive the same effect by using another (old) interface.

Syntax

CxQL

```
public CxList CxSelectDomProperty<T>(Func<T,IGraph> lambda) where T:CSharpGraph
```

Parameters

lambda

Method that define require DOM property.

Return Value

New list of requested properties.

Exceptions

Exception type	Condition
ArgumentNullException	**parameter is a null reference**

Comments

The return value may be empty (Count = 0).

Example

```
CxQL

These examples demonstrates using of CxList.CxSelectDomProperty() method.
Example 1 : Get all TrueStatements of type IfStmt and Statements
of IterationStmt
//Current Solution
CxList False = Find_Always_False();
foreach (CxList t in False)
{
  CxList cond = t.GetFathers();
  if (cond.FindByType(typeof(IfStmt)).Count > 0)
  {
    IfStmt ifStmt = cond.data.GetByIndex(0) as IfStmt;
    falseBlocks.Add(ifStmt.TrueStatements.NodeId, ifStmt.TrueStatements);
  }
  else if (cond.FindByType(typeof(IterationStmt)).Count > 0)
  {
    IterationStmt iter = cond.data.GetByIndex(0) as IterationStmt;
    falseBlocks.Add(iter.Statements.NodeId, iter.Statements);
  }
}

// new solution
CxList False = Find_Always_False();
var cond = False.GetFathers();
var falseOfIf = cond.CxSelectDomProperty<IfStmt>(x => x.TrueStatements);
var falseOfIteration =
                cond.CxSelectDomProperty<IterationStmt>(x => x.Statements);
var falseBlock = falseOfIf + falseOfIteration;

Example 2 :  Get some data based on “Left” property of AssignExpr
//Current Solution
foreach(CxList g in assignsExpr)
{
  AssignExpr ae = g.TryGetCSharpGraph<AssignExpr>();
  Expression e = ae.Left;
  CxList curNode = All.FindById(e.NodeId);
  left.Add(All.GetByAncs(curNode));
}
// new solution
CxList curNodes = assignsExpr.CxSelectDomProperty<AssignExpr>(x =>x.Left);
left.Add(All.GetByAncs(curNodes));
```

Version Information

Supported from v9.2.0

5.12 CxList.CxSelectElements<T> Method (Func<T,IGraph, option) where T : CSharpGraph

Returns a new CxList of all required elements of input CxList. <T> is dom object type that this method get property from it. Main purpose of interface is hide internal DOM and CxList structures.

Syntax

```
CxQL
```

```
public CxList CxSelectElements<T>(Func<T,IGraph> lambda, int option = -1)
where T:CSharpGraph
```

Parameters

lambda

Method that define require DOM property.

option

If option is -1 → iterate on all possible elements.

If option is 0 →return only first element.

Return Value

New CxList of all required elements of input CxList.

Exceptions

Exception type	Condition
ArgumentNullException	**parameter is a null reference**

Comments

The return value may be empty (Count = 0).

Example

CxQL

```
These examples demonstrates using of CxList.CxSelectDomProperty() method.
Example 1 : Get first element of Indices of input CxList (query “Value_Shadowing”
C# medium)

//Current Solution
CxList variables = All.FindByType(typeof(IndexerRef));
CxList problematic = variables.FindByTypes(new string[]
{"Request","HttpRequest"});

foreach(KeyValuePair<int,IGraph> elem in problematic.data)
{
  try
  {
    IndexerRef ir = elem.Value as IndexerRef;
    CSharpGraph el = ir.Indices[0];
    result.Add(el.NodeId, el);
  }
  catch(Exception exc)
  {
    cxLog.WriteDebugMessage(exc);
  }
}

// new solution
CxList variables = All.FindByType(typeof(IndexerRef));
CxList problematic = variables.FindByTypes(new string[]
{"Request","HttpRequest"});
result = problematic.CxSelectElements<IndexerRef>(x=>x.Indices,0);

Example 2 :  query Find_Array_Indexes (GO, general)
//Current Solution
CxList arraysOrSlices = Find_IndexerRefs();
CxList arrayAccesses = All.NewCxList();
```

```
foreach(CxList arrayOrSlice in arraysOrSlices)
{
  IndexerRef idxRef = arrayOrSlice.TryGetCSharpGraph<IndexerRef>();
  foreach (var expr in idxRef.Indices)
  {
    if (expr is CSharpGraph)
    {
      arrayAccesses.Add(expr.NodeId, expr);
    }
  }
}
result = arrayAccesses;

// new solution
CxList arraysOrSlices = Find_IndexerRefs();
result = arraysOrSlices.CxSelectElements<IndexerRef>(x=>x.Indices);
```

Version Information

Supported from v9.2.0

5.13 CxList.CxSelectElementsValues<T,I>(Func<T,I>) where: T : CSharpGraph

Returns list of requires property values of dom object of <TDomObject> and return list of <TOutput>. For more details see example. Main purpose of this method is hide internal CxList structure (data)

Syntax

CxQL

```
public List<TOutput> CxSelectElementValues<TDomObject,TOutput> (Func<
TDomObject,TOutput > lambda) where TDomObject:CSharpGraph
```

Parameters

lambda

Method that define property to extract from require dom object.

Return Value

New List of all required values..

Exceptions

Exception type	Condition
ArgumentNullException	**parameter is a null reference**

Comments

The return value may be empty (Count = 0).

Example

CxQL

```
These examples demonstrates using of CxList.CxSelectElementValues() method.
Example : Compare parameter name of two methods (implementation and
declaration) If name of parameters are different add to result method declaration
and method implementation
```

```
(query "R16_04_Different_Identifiers_In_Function_Definition_And_Prototype" CPP
Misra)

//Current Solution
for (int i = 0;i < curParams.Count;i++)
{
   ParamDecl cur = curParams.curParams.data.GetByIndex(i) as ParamDecl;
   ParamDecl comp = compParams.data.GetByIndex(i) as ParamDecl;
   if (String.Compare(cur.Name, comp.Name) != 0)
   {
        result.Add(curMethodDecl + compMethodDecl);
        break;
   }
}

// new solution
var curListNames  =
       curParams.CxSelectElementValues<ParamDecl,string>(x => x.Name);
var compListNames =
       compParams.CxSelectElementValues<ParamDecl,string>(x => x.Name);
for (int i = 0; i < curListNames.Count; i++)
{
    if (String.Compare(curListNames[i], compListNames[i]) != 0)
    {
        result.Add(curMethodDecl + compMethodDecl);
        break;
    }
}
```

Version Information

Supported from v9.2.0

5.14 CxList.ExtractFromSOQL Method ()

Extracts the parameters of a SOQL statement into a dictionary.

Syntax

```
CxQL
public Dictionary<String, List<String>> ExtractFromSOQL()
```

Return Value

A dictionary with keys that match SOQL keywords and their relevant parameters.

Exceptions

Exception type	Condition
ArgumentNullException	**parameter is a null reference**

Comments

The return value may be empty (Count = 0).

Example

```
CxQL

 This example demonstrates the CxList.ExtractFromSOQL() method.
 The input source code is:
```

```
int b = 0;
String a = “select * from table where x=“ + b;

Dictionary <String, List<String>> result = All.ExtractFromSOQL();

 the result would consist of 3 results:
              { “select” : “*”,
                “from”  : “table”,
                “where” : “x=” }
```

5.15 CxList.ExtractFromSOQL Method (string)

Extracts the parameters of the given keyword from a SOQL statement into a list.

Syntax

```
CxQL
public List<string> ExtractFromSOQL(string keyword)
```

Parameters

keyword

The SOQL keyword to extract.

Return Value

A list with the parameters of the keyword.

Exceptions

Exception type	Condition
ArgumentNullException	**parameter is a null reference**

Remarks

The return value may be empty (Count = 0).

Example

The following code example shows how you can use the ExtractFromSOQL method.

```
CxQL

 This example demonstrates the CxList.ExtractFromSOQL() method.
 The input source code is:

int b = 0;
String a = “select * from table where x=“ + b;

List <String> result = All.ExtractFromSOQL("select");

 the result would be -
      1 item found:
              [“*”]
```

5.16 CxList.DataInfluencedBy Method (CxList)

Returns a CxList which is a subset of “this” instance and its elements are data influenced by the CxList specified in parameter.

This call is equivalent to the following calls and it is recommended to use the short call format by default:

- DataInfluencedBy(list, InfluenceAlgorithmCalculation.OldAlgorithm)

Syntax

```
CxQL
public CxList DataInfluencedBy(CxList influencing)
```

Parameters

influencing

CxList data-influencing on "this" instance.

Return Value

A subset of "this" instance data influenced by the specified CxList.

Exceptions

Exception type	Condition
ArgumentNullException	**parameter is a null reference**

Remarks

The return value may be empty (Count = 0).

Example

```
CxQL

 This example demonstrates the CxList.DataInfluencedBy() method.
 The input source code is:

 int b, a = 5;
 if (a > 3)
      b = a;

CxList five = All.FindByName("5");
result = All.DataInfluencedBy(five);

 the result would be -
      6 items found:
            a (in a = 5),
            a (in a > 3),
            > (in a > 3),
            a (in b = a),
            = (in b = a),
            b (in b = a)
```

5.17 CxList.DataInfluencedBy Method (CxList, InfluenceAlgorithmCalculation)

Returns a CxList which is a subset of this instance and its elements are data influenced by the CxList specified in the first parameter using the influence algorithm specified in the second parameter.

Syntax

```
CxQL
public CxList DataInfluencedBy(CxList influencing, InfluenceAlgorithmCalculation
algorithm)
```

Parameters

influencing

CxList data-influencing on "this" instance.

algorithm

An enum matching the relevant InfluenceAlgorithmCalculation options which are:

OldAlgorithm, NewAlgorithm

Return Value

A subset of "this" instance data influenced by the specified CxList.

Exceptions

Exception type	Condition
ArgumentNullException	**parameter is a null reference**

Remarks

The return value may be empty (Count = 0).

Example

```
CxQL

 This example demonstrates the CxList.DataInfluencedBy() method.
 The input source code is:
 int b, a = 5;
 if (a > 3)
      b = a;

CxList five = All.FindByName("5");
result = All.DataInfluencedBy(five,
CxList.InfluenceAlgorithmCalculation.NewAlgorithm);
 the result would be -
      6 items found:
            a (in a = 5),
            a (in a > 3),
            > (in a > 3),
            a (in b = a),
            = (in b = a),
            b (in b = a)
```

5.18 CxList.DataInfluencingOn Method (CxList)

Returns a CxList which is a subset of "this" instance and its elements are data influencing on the CxList specified in parameter.

This call is equivalent to the following calls and it is recommended to use the short call format by default:

- `DataInfluencingOn(list, InfluenceAlgorithmCalculation.OldAlgorithm)`

Syntax

```
CxQL
public CxList DataInfluencingOn(CxList influenced)
```

Parameters

influenced

CxList data-influenced by "this" instance.

Return Value

A subset of "this" instance data influencing on the specified CxList.

Exceptions

Exception type	Condition
ArgumentNullException	**parameter is a null reference**

Remarks

The return value may be empty (Count = 0).

Example

```
CxQL

 This example demonstrates the CxList.DataInfluencingOn() method.
 The input source code is:

 int b, a = 5;
 if (a > 3)
      b = a;

CxList b = All.FindByName("*.b");
result = All.DataInfluencingOn(b);

 the result would be -
      3 items found:
            a (in b = a),
            a (in a = 5),
            5 (in a = 5)
```

5.19 CxList.DataInfluencingOn Method (CxList, InfluenceAlgorithmCalculation)

Returns a CxList which is a subset of "this" instance and its elements are data influencing on the CxList specified in the first parameter using the influence algorithm specified in the second parameter.

Syntax

```
CxQL
public CxList DataInfluencingOn(CxList influenced, InfluenceAlgorithmCalculation
algorithm)
```

Parameters

influenced

CxList data-influenced by "this" instance.

algorithm

An enum matching the relevant InfluenceAlgorithmCalculation options which are:

OldAlgorithm, NewAlgorithm

Return Value

A subset of "this" instance data influencing on the specified CxList.

Exceptions

Exception type	Condition
ArgumentNullException	**parameter is a null reference**

Remarks

The return value may be empty (Count = 0).

Example

```
CxQL

 This example demonstrates the CxList.DataInfluencingOn() method.
 The input source code is:

 int b, a = 5;
 if (a > 3)
      b = a;

CxList b = All.FindByName("*.b");
result = All.DataInfluencingOn(b,
              CxList.InfluenceAlgorithmCalculation.NewAlgorithm);

 the result would be -
      3 items found:
            a (in b = a),
            a (in a = 5),
            5 (in a = 5)
```

5.20 CxList.InfluencedBy Method (CxList)

Returns a CxList which is a subset of "this" instance and its elements are influenced (either data or control) by the CxList specified in parameter.

This call is equivalent to the following calls and it is recommended to use the short call format by default:

- `InfluencedBy(list, InfluenceAlgorithmCalculation.OldAlgorithm)`

Syntax

```
CxQL
public CxList InfluencedBy(CxList influencing)
```

Parameters

influencing

CxList data-influencing on "this" instance.

Return Value

A subset of "this" instance influenced by (either data or control) the specified CxList.

Exceptions

Exception type	Condition
ArgumentNullException	**parameter is a null reference**

Remarks

The return value may be empty (Count = 0).

Example

```
CxQL

 This example demonstrates the CxList.InfluencedBy() method.
 Notice the difference between DataInfluencedBy  and InfluencedBy
 The input source code is:
 int b = 2, a = 5, c;
```

```
 if (a > b)
      b = 3;
 c = b;
result = All.InfluencedBy(All.FindById(43)); // Id 43 is 5 from a = 5;
 Notice that among all the results also c (in c = b) appears because c is
 data-dependant on  b=3, which in turn is control dependant on a > b, which
itself is data-dependant on a = 5.

result = All.DataInfluencedBy(All.FindById(43)); // 5
 Notice that now c (in c = b) doesn't appear because its value is not
 influenced by 5.
```

5.21 CxList.InfluencedBy Method (CxList, InfluenceAlgorithmCalculation)

Returns a CxList which is a subset of "this" instance and its elements are influenced (either data or control) by the CxList specified in the first parameter using the influence algorithm specified in the second parameter.

Syntax

```
CxQL
public CxList InfluencedBy(CxList influencing, InfluenceAlgorithmCalculation
algorithm)
```

Parameters

influencing

CxList data-influencing on "this" instance.

algorithm

An enum matching the relevant InfluenceAlgorithmCalculation options which are:

OldAlgorithm, NewAlgorithm

Return Value

A subset of "this" instance influenced by (either data or control) the specified CxList.

Exceptions

Exception type	Condition
ArgumentNullException	**parameter is a null reference**

Remarks

The return value may be empty (Count = 0).

Example

```
CxQL

 This example demonstrates the CxList.InfluencedBy() method.
 Notice the difference between DataInfluencedBy  and InfluencedBy
 The input source code is:
 int b = 2, a = 5, c;
 if (a > b)
      b = 3;
 c = b;
result = All.InfluencedBy(All.FindById(43),
       CxList.InfluenceAlgorithmCalculation.NewAlgorithm); // Id 43 is 5 from a
= 5;
```

```
 Notice that among all the results also c (in c = b) appears because c is
 data-dependant on  b = 3, which in turn is control dependant on a > b, which
itself is data-dependant on a = 5.

result = All.DataInfluencedBy(All.FindById(43)); // 5
 Notice that now c (in c = b) doesn't appear because its value is not
 influenced by 5.
```

5.22 CxList.InfluencedByAndNotSanitized Method (CxList, CxList)

Returns a CxList which is a subset of "this" instance and its elements are influenced by the CxList specified in the first parameter, and their influencing path doesn't contain elements from the CxList specified in the second parameter.

This call is equivalent to the following calls and it is recommended to use the short call format by default:

- `InfluencedByAndNotSanitized(influencing, sanitized, InfluenceAlgorithmCalculation.OldAlgorithm)`

Syntax

```
CxQL
public CxList InfluencedByAndnotSanitized(CxList influencing, CxList
sanitization)
```

Parameters

Influencing

CxList influencing on "this" instance.

sanitization

CxList that "cuts" the influencing path.

Return Value

A subset of "this" instance and its elements are influenced by the first specified parameter, and their influencing path doesn't contain element from the second CxList.

Exceptions

Exception type	Condition
ArgumentNullException	**parameter is a null reference**

Remarks

The return value may be empty (Count = 0).

Example

```
CxQL

 This example demonstrates the CxList.InfluencedByAndNotSanitized()
 method.
 The input source code is:

           string s = input();
           string s1 = fixSql(s);
           string s2 = s + s1;

           execute(s);      (*)
           execute(s1);
```

```
            execute(s2);     (*)

            s = s1;
            execute(s);
            execute(s1);
            execute(s2);     (*)

            s2 = s;
            execute(s);
            execute(s1);
            execute(s2);

CxList execute = All.FindByName("execute");
CxList input = All.FindByName("input");
CxList fixSql = All.FindByName("fixSql");
result = execute.InfluencedByAndNotSanitized(input, fixSql);

 Notice that only the lines marked with a (*) are returned. These are the
 only statements that have an influencing path from the input() command,
 without being completely sanitized by fixSql().
```

5.23 CxList.InfluencedByAndNotSanitized Method (CxList, CxList, InfluenceAlgorithmCalculation)

Returns a CxList which is a subset of "this" instance and its elements are influenced by the CxList specified in the first parameter, and their influencing path doesn't contain elements from the CxList specified in the second parameter, using the influence algorithm specified in the third parameter.

Syntax

```
CxQL
public CxList InfluencedByAndnotSanitized(CxList influencing, CxList
sanitization, InfluenceAlgoritmCalculation algorithm)
```

Parameters

influencing

CxList influencing on "this" instance.

sanitization

CxList that "cuts" the influencing path.

algorithm

An enum matching the relevant InfluenceAlgorithmCalculation options which are:

OldAlgorithm, NewAlgorithm

Return Value

A subset of "this" instance and its elements are influenced by the first specified parameter, and their influencing path doesn't contain element from the second CxList.

Exceptions

Exception type	Condition
ArgumentNullException	**parameter is a null reference**

Remarks

The return value may be empty (Count = 0).

Example

```
CxQL

 This example demonstrates the CxList.InfluencedByAndNotSanitized()
 method.
 The input source code is:

            string s = input();
            string s1 = fixSql(s);
            string s2 = s + s1;

            execute(s);      (*)
            execute(s1);
            execute(s2);     (*)

            s = s1;
            execute(s);
            execute(s1);
            execute(s2);     (*)

            s2 = s;
            execute(s);
            execute(s1);
            execute(s2);

CxList execute = All.FindByName("execute");
CxList input = All.FindByName("input");
CxList fixSql = All.FindByName("fixSql");
result = execute.InfluencedByAndNotSanitized(input, fixSql,
          CxList.InfluenceAlgorithmCalculation.NewAlgoritm);

 Notice that only the lines marked with a (*) are returned. These are the
 only statements that have an influencing path from the input() command,
 without being completely sanitized by fixSql().
```

5.24 CxList.InfluencingOn Method (CxList)

Returns a CxList which is a subset of "this" instance and its elements are influencing (data and control) on the CxList specified in parameter.

This call is equivalent to the following calls and it is recommended to use the short call format by default:

- `InfluencingOn(influenced, InfluenceAlgorithmCalculation.OldAlgorithm)`

Syntax

```
CxQL
public CxList InfluencingOn (CxList influenced)
```

Parameters

influenced

CxList influenced by "this" instance.

Return Value

A subset of "this" instance influencing on the specified CxList.

Exceptions

Exception type	Condition

ArgumentNullException	**parameter is a null reference**

Remarks

The return value may be empty (Count = 0).

Example

```
CxQL

 This example demonstrates the CxList.InfluencingOn() method.
 The input source code is:

 int a;
 a = 5;
 b = a;

CxList b_var = All.FindByShortName("b");
result = All.InfluencingOn(b_var);

 the result would be -
      3 items found:
            5,
            a,
             a
```

Version Information

CxAudit

Supported from v1.8.1

5.25 CxList.InfluencingOn Method (CxList, InfluenceAlgorithmCalculation)

Returns a CxList which is a subset of "this" instance and its elements are influencing (data and control) on the CxList specified in the first parameter using the influence algorithm specified in the second parameter.

Syntax

```
CxQL
public CxList InfluencingOn (CxList influenced, InfluenceAlgorithmCalculation
algorithm)
```

Parameters

influenced

CxList influenced by "this" instance.

algorithm

An enum matching the relevant InfluenceAlgorithmCalculation options which are:

OldAlgorithm, NewAlgorithm

Return Value

A subset of "this" instance influencing on the specified CxList.

Exceptions

Exception type	Condition
ArgumentNullException	**parameter is a null reference**

Remarks

The return value may be empty (Count = 0).

Example

```
CxQL

 This example demonstrates the CxList.InfluencingOn() method.
 The input source code is:

 int a;
 a = 5;
 b = a;

CxList b_var = All.FindByShortName("b");
result = All.InfluencingOn(b_var,
                CxList.InfluenceAlgorithmCalculation.NewAlgorithm);

 the result would be -
      3 items found:
             5,
             a,
             a
```

5.26 CxList.InfluencingOnAndNotSanitized Method (CxList,CxList)

Returns a CxList which is a subset of "this" instance and its elements are influencing on (Data or Control), and an influencing path exists which doesn't contain elements from the sanitization.

This call is equivalent to the following calls and it is recommended to use the short call format by default:

- `InfluencingOnAndNotSanitized(list, InfluenceAlgorithmCalculation.OldAlgorithm)`

Syntax

```
CxQL
public CxList InfluencingOnAndNotSanitized (CxList influencing, CxList
sanitization)
```

Parameters

influencing

CxList influencing on "this" instance.

sanitization

CxList that "cuts" the influencing path

Return Value

A subset of "this" instance and its elements are influencing on the first specified parameter, and their influencing path doesn't contain elements from the CxList specified in second parameter.

Exceptions

Exception type	Condition
ArgumentNullException	**parameter is a null reference**

Remarks

The return value may be empty (Count = 0).

Example

```
CxQL

 This example demonstrates the CxList.InfluencingOnandNotSanitized()
 method.
 The input source code is:

            string s = input();
            string s1 = fixSql(s);
            string s2 = s + s1;

            execute(s);      (*)
            execute(s1);
            execute(s2);     (*)

            s = s1;
            execute(s);
            execute(s1);
            execute(s2);     (*)

            s2 = s;
            execute(s);
            execute(s1);
            execute(s2);
CxList execute = All.FindByName("execute");
CxList input = All.FindByName("input");
CxList fixSql = All.FindByName("fixSql");
result = input.InfluencingOnAndNotSanitized(execute, fixSql);

 Notice that only the first line is returned (string s = input();)
```

5.27 CxList.InfluencingOnAndNotSanitized Method (CxList,CxList,InfluenceAlgorithmCalculation)

Returns a CxList which is a subset of “this” instance and its elements are influencing on (Data or Control), and an influencing path exists which doesn't contain elements from the sanitization using the influence algorithm specified in the third parameter.

Syntax

```
CxQL
public CxList InfluencingOnAndNotSanitized (CxList influencing, CxList
sanitization, InfluenceAlgorithmCalculation algorithm)
```

Parameters

influencing

CxList influencing on this instance.

sanitization

CxList that "cuts" the influencing path

algorithm

An enum matching the relevant InfluenceAlgorithmCalculation options which are:

OldAlgorithm, NewAlgorithm

Return Value

A subset of "this" instance and its elements are influencing on the first specified parameter, and their influencing path doesn't contain elements from the CxList specified in the second parameter.

Exceptions

Exception type	Condition
ArgumentNullException	**parameter is a null reference**

Remarks

The return value may be empty (Count = 0).

Example

```
CxQL

 This example demonstrates the CxList.InfluencingOnandNotSanitized()
 method.
 The input source code is:

            string s = input();
            string s1 = fixSql(s);
            string s2 = s + s1;

            execute(s);      (*)
            execute(s1);
            execute(s2);     (*)

            s = s1;
            execute(s);
            execute(s1);
            execute(s2);     (*)

            s2 = s;
            execute(s);
            execute(s1);
            execute(s2);
CxList execute = All.FindByName("execute");
CxList input = All.FindByName("input");
CxList fixSql = All.FindByName("fixSql");
result = input.InfluencingOnAndNotSanitized(execute, fixSql,
           CxList.InfluenceAlgorithmCalculation.NewAlgorithm);

 Notice that only the first line is returned (string s = input();)

 This query would return 1 result with a path from p declaration to the
Console.WriteLine, passing through the MemberAccess p.X
```

5.28 CxList.NotInfluencedBy Method (CxList)

Returns a CxList which is a subset of "this" instance and its elements are not influenced (either data or control) by the CxList specified in parameter.

Syntax

```
CxQL
```

```
public CxList NotInfluencedBy(CxList influencing)
```

Parameters

influencing

CxList data on "this" instance.

Return Value

A subset of "this" instance not influenced by (either data or control) the specified CxList.

Exceptions

Exception type	Condition
ArgumentNullException	**parameter is a null reference**

Remarks

The return value may be empty (Count = 0).

Example

```
CxQL

 This example demonstrates the CxList.NotInfluencedBy() method.

 The input source code is:
 int b = 2, a = 5, c;
 if (a > b)
      b = 3;
 c = b;

result = All.NotInfluencedBy(All.FindById(43)); // 5
 Returns every object besides a and 5 (from a = 5) and a (from a > b)
 Notice that among all the results also b (in b = 2) appears because it does not
influence the value of a.
```

5.29 CxList.NotInfluencingOn Method (CxList)

Returns a CxList which is a subset of "this" instance and its elements are not influencing (data and control) on the CxList specified in parameter.

Syntax

```
CxQL
public CxList NotInfluencingOn (CxList notInfluenced)
```

Parameters

notInfluenced

CxList data in "this" instance.

Return Value

A subset of "this" instance not influencing on the specified CxList.

Exceptions

Exception type	Condition
ArgumentNullException	**parameter is a null reference**

Remarks

The return value may be empty (Count = 0).

Example

```
CxQL

 This example demonstrates the CxList.NotInfluencingOn() method.
 The input source code is:

 int a, c = 3;
 a = 5;
 b = a;

CxList b_var = All.FindByShortName("b");
result = All.NotInfluencingOn(b_var);

 the result would be -
      2 items found:
             c,
             3
```

5.30 CxList Filter Methods

Here is definition of CSharpGraph dom object DTO (data transfare object)

```
public struct DOMProperties
{
   public string     ShortName; // dom object short name
   public string     FileName;  // file name of dom object
   public int        FileId;    // file id of dom object
   public string     FullName;  // dom object full name
   public GraphTypes GraphType; // represent type of dom object
   public int        Line;      // source line
   public int        Column;    // source column
}
```

5.30.1 CxList.GetDOMPropertiesOfFirst()

This method implements DTO of CSharpGraph dom object. It returns DTO of first dom object in CxList. Important reason for this interface is to hide internal structure of CSharpGraph dom object.

Syntax

```
CxQL
public DOMProperties GetDOMProperties();
```

Parameters

Return Value

A DTO of first element of the given CxList.

Exceptions

Exception type	Condition
ArgumentNullException	**parameter is a null reference**

Version Information

Supported from v9.2.0

5.30.2 CxList.Filter(Func<DOMProperties,bool)

This method implements a new filter. It returns subset of "this". It is very similar to "Where" of LINQ.

Syntax

CxQL
```
public CxList Filter(Func<DOMProperties, bool> condition);
```

Parameters

Condition

Lambda method that define filter condition

Return Value

A subset of "this" instance, with elements that fulfilled lambda condition in the given CxList.

Exceptions

Exception type	Condition
ArgumentNullException	**parameter is a null reference**

Comments

The return value may be empty (Count = 0).

Example

CxQL
```
This example demonstrates using of the CxList.Filter() method.
Get all Dom object with short name less than 50 characters

// current implementation
foreach (CxList r in tempResult)
{
   CSharpGraph g = r.data.GetByIndex(0) as CSharpGraph;
   If (g == null || g.ShortName == null)
   {
      continue;
   }
   if (g.ShortName.Length < 50)
   {
      result.Add(r);
   }
}

// new implementation
result = tempResult.Filter(x => x.ShortName.Length < 50);


This example demonstrates using of the CxList.Filter() and
GetDOMPropertiesOfFirst methods.

// current implementation
CxList sanitizers = All.NewCxList();
//Get all the elements that appear only after the position (line) of the header
foreach(CxList header in good_content_header_methods)
{
   CSharpGraph header_obj = header.TryGetCSharpGraph<CSharpGraph>();
   CxList methods_after_header =
          possible_sanitizers.GetByAncs(header.GetFathers().GetFathers());
   foreach(CxList method_after_header in methods_after_header)
   {
```

```
      CSharpGraph method_after_header_obj = method_after_header.
                                          TryGetCSharpGraph<CSharpGraph>();
      if(method_after_header_obj.LinePragma.Line >=
                                               header_obj.LinePragma.Line)
      {
         sanitizers.Add(method_after_header);
      }
   }
}

// new implementation
CxList sanitizers = All.NewCxList();
//Get all the elements that appear only after the position (line) of the header
foreach(CxList header in good_content_header_methods)
{
   int HeaderLineNumber = header.GetDOMPropertiesOfFirst().Line;
   CxList methods_after_header =
            possible_sanitizers.GetByAncs(header.GetFathers().GetFathers());
   sanitizers.Add(methods_after_header.Filter(x => x.Line >=
                                                    HeaderLineNumber));}
```

Version Information

Supported from v9.2.0

5.30.3 CxList.FilterByDomProperty<T> Method (Func<T, bool>) where T:CSharpGraph

Returns a CxList which is a subset of "this" instance, with elements that match input lambda method

Syntax

```
CxQL
public CxList FilterByDomProperty<T>(Func<T, bool> condition) where T:
CSharpGraph;
```

Parameters

condition

Lambda method that define/implement require condition.

Return Value

A subset of "this" instance, with elements that fulfilled lambda condition in the given CxList.

Exceptions

Exception type	Condition
ArgumentNullException	**parameter is a null reference**

Comments

The return value may be empty (Count = 0).

Example

```
CxQL
```

```
This example demonstrates using of the CxList.FilterByDomProperty() method. Get
all AssignExpr with operator equal to AdditionAssign

// current implementation
foreach(CxList assignment in assignments)
{
    AssignExpr graph = assignment.TryGetCSharpGraph<AssignExpr>();
```

```
    if (graph != null && graph.Operator == AssignOperator.AdditionAssign)
       assignAdd.Add(assignment);
}

// new implementation
CxList assignAdd = assignments.
             FilterByDomProperty<AssignExpr>(x =>x.Operator ==
                                             AssignOperator.AdditionAssign);
```

Version Information

Supported from v9.2.0

5.31 CxList.FindAllMembers Method (CxList)

Returns a CxList which is a subset of "this" instance, with elements that are members of the classes in the given CxList.

Syntax

```
CxQL
public CxList FindAllMembers(CxList Ids)
```

Parameters

Ids

The list of Classes whose members are to be found.

Return Value

A subset of "this" instance, with elements that are members of the classes in the given CxList.

Exceptions

Exception type	Condition
ArgumentNullException	**parameter is a null reference**

Comments

The return value may be empty (Count = 0).

Example

```
CxQL

 This example demonstrates the CxList.FindAllMembers() method.
 The input source code is:

public class MyClass
{
 public int b, a = 5;
 boolean c=false;
}
result = All.FindAllMembers(All.FindByName("MyClass"));
 The result would consist of 3 items:
             b (public int b, a = 5;),
             a (public int b, a = 5;),
             c (boolean c=false)
```

5.32 CxList.FindAllReferences Method (CxList)

Returns a CxList which is a subset of "this" instance, with elements that are references of the given CxList.

Syntax

```
CxQL
public CxList FindAllReferences(CxList referenced)
```

Parameters

referenced

The CxList whose references are to be found.

Return Value

A subset of "this" instance, with elements that are references of the given CxList.

Exceptions

Exception type	Condition
ArgumentNullException	**parameter is a null reference**

Comments

The return value may be empty (Count = 0).

Example

```
CxQL

 This example demonstrates the CxList.FindAllRefernces() method.
 The input source code is:

 int b, a = 5;
 if (a > 3)
      b = a;

result = All.FindAllReferences(All.FindById(36)); //a in (a = 5)

 the result would consist of 3 items:
             a (in a = 5),
             a (in a > 5),
             a (in b = a)
```

5.33 CxList.FindAllReferences Method (CxList, CxList)

Returns a CxList which is a subset of "this" instance, with elements that are references of the given CxList, excluding elements in the second CxList.

Syntax

```
CxQL
public CxList FindAllReferences(CxList referenced, CxList exclude)
```

Parameters

referenced

The CxList whose references are to be found.

exclude

The CxList whose elements will be ignored and excluded.

Return Value

A subset of "this" instance, with elements that are references of the given CxList.

Exceptions

Exception type	Condition
ArgumentNullException	**parameter is a null reference**

Comments

The return value may be empty (Count = 0).

Example

```
CxQL

 This example demonstrates the CxList.FindAllRefernces() method.
 The input source code is:

 int b, a = 5;
 if (a > 3)
      b = a;

result = All.FindAllReferences(All.FindById(36), All.FindById(30)); //a in (a =
5), b in (int b)

 the result would consist of 3 items:
             a (in a = 5),
             a (in a > 5),
             a (in b = a)
```

5.34 CxList.FindByAssignmentSide Method (AssignmentSide)

Returns a CxList which is a subset of "this" instance and its elements are being on the given side of an assignment expression.

Syntax

```
CxQL
public CxList FindByAssignmentSide(CxList.AssignmentSide side)
```

Parameters

side

The side of the assignment expression, which can be one of the following values: Left, Right (see Section AssignmentSide).

Return Value

A subset of "this" instance on the specified side of an assignment expression.

Exceptions

Exception type	Condition
ArgumentNullException	**parameter is a null reference**

Comments

The return value may be empty (Count = 0).

Example

```
CxQL

 This example demonstrates the CxList.FindByAssignmentSide() method.
```

```
The input source code is:

a = 3;
b = a;
if (a == 4)
     b = a - 1;

result = All.FindByAssignmentSide(CxList.AssignmentSide.Left);

The result would consist of 3 items:
            a (in a = 3),
            b (in b = a),
            b (in b = a - 1)
```

Version Information

Supported from v1.8.1

5.35 CxList.FindByCustomAttribute Method (string)

Returns a CxList which is a subset of "this" instance and its elements are custom attributes of the specified name.

Syntax

```
CxQL
public CxList FindByCustomAttribute(string name)
```

Parameters

name

The attribute name.

Return Value

A subset of "this" instance with custom attributes of the specified name.

Exceptions

Exception type	Condition
ArgumentNullException	**parameter is a null reference**

Comments

The return value may be empty (Count = 0).

Example

```
CxQL

This example demonstrates the CxList.FindByCustomAttribute() method.
The input source code is:

[WebMethod]
void foo()
{

}

result = All. FindByCustomAttribute("WebMethod");

the result would consist of 1 item:
            foo
```

5.36 CxList.FindByExtendedType Method (string)

Returns a CxList which is a subset of "this" instance and the type of its elements match the type specified as parameter.

Syntax

```
CxQL
public CxList FindByExtendedType (string extendedType)
```

Parameters

extendedType

The extended type of the objects to be found. Prefix and postfix wildcard (*) are supported.

Return Value

A subset of "this" instance and its elements are those with type specified by the parameter.

Exceptions

Exception type	Condition
ArgumentNullException	**parameter is a null reference**

Comments

The return value may be empty (Count = 0).

Example

```
CxQL

 This example demonstrates the CxList.FindByExtendedType() method.
 The input source code is:

MyClass a;
 MyClassExtended b;
 int c;
 a.DataMember = 3;
 c = a.Method();

result = All.FindByExtendedType ("MyClass*");
 the result would consists of 4 items:
             a (in MyClass a)
             b (in MyClassExtended b)
             a (in a.DataMember = 3)
             a (in c = a.Method())
```

5.37 CxList.FindByFathers Method (CxList)

Returns a CxList which is a subset of "this" instance and its elements are those that their CxDOM-Fathers are in the specified CxList.

Syntax

```
CxQL
public CxList FindByFathers(CxList fathers)
```

Parameters

fathers

A CxList consisting of the Fathers to be matched.

Return Value

A subset of "this" instance and its elements are those which their CxDOM-Fathers are in the specified CxList.

Exceptions

Exception type	Condition
ArgumentNullException	**parameter is a null reference**

Comments

The return value may be empty (Count = 0).

Example

```
CxQL
 This example demonstrates the CxList.FindByFathers() method.
 First we find the number "3", then we seek for 3's fathers (which are
 the assignment expressions), finally we look for the
 assignment-expressions' sons (the "a", "b" and the "3"s)
 Input source code is:

 a = 3;
 b = a;
 if (a == 4)
      b = a - 1;
CxList three = All.FindByName("*.3");
CxList threesFathers = three.GetFathers();
Result = All.FindByFathers(threesFathers);
 the result would be -
      4 items found:
            a (in a = 3),
            3 (in a = 3),
            b (in b = 3),
            3 (in b = 3)
```

5.38 CxList.FindByFieldAttributes Method (Modifiers)

Returns a CxList which is a subset of "this" instance and its elements are modified by the modifier (private, external, etc).

Syntax

```
CxQL
public CxList FindByFieldAttributes(Modifiers attrib)
```

Parameters

Attrib

Attribute of the fields to be found.

Return Value

A subset of "this" instance and its elements are those with attribute attrib.

Exceptions

Exception type	Condition
ArgumentNullException	**parameter is a null reference**

Comments

The return value may be empty (Count = 0).

Example

```
CxQL

 This example demonstrates the CxList.FindByAttributes() method.
 Input source code is:
 public class cl1{
          private void foo(){}
          protected void guu(){}
          private int a,b;
          protected int c;
  }

result=All.FindByFieldAttributes(Modifiers.Protected);
 the result would be -
      2 items found:
            guu (in protected void guu(){}),
            c (int c;)
```

Version Information

Supported from **CxAudit** v2.0.5

5.39 CxList.FindByFileName Method (string)

Returns a CxList which is a subset of "this" instance and its elements are in a given source code file.

Syntax

```
CxQL
public CxList FindByFileName(string FileName)
```

Parameters

FileName

String with the file name.

Return Value

A subset of "this" instance with elements from a given file name.

Exceptions

Exception type	Condition
ArgumentNullException	**parameter is a null reference**

Comments

The return value may be empty (Count = 0).

Example

```
CxQL

 This example demonstrates the CxList.FindByFileName() method.

 The input source code is:

 //file myCode.cs
 class Cl {
       void foo() {
              int i;
       }
```

```
 }

result = All.FindByFileName("*myCode.cs");

 the result consists of 5 items:
             Cl
             void,
             foo,
               int,
               i
```

Version Information

Supported from v1.8.1

5.40 CxList.FindById Method (int)

Finds all objects with the specified id. This method is mainly used to find all the uses of a code element (e.g. variable, class).

Syntax

```
CxQL
public CxList FindById (int id)
```

Parameters

id

id number to be found.

Return Value

A subset of "this" instance and its elements that have the specified id number.

Exceptions

Exception type	Condition
ArgumentNullException	**parameter is a null reference**

Comments

The return value may be empty (Count = 0).

Example

```
CxQL

 This example demonstrates the CxList.FindById() method.
 The input source code is:

 a = 3;
 b = a;
 if (a == 4)
      b = a - 1;

result = All.FindById(60);

 the result would be -
      1 item found:
            b (in b = a - 1)
```

5.41 CxList.FindByInitialization Method (CxList)

Returns a CxList which is a subset of "this" instance and contains elements initialized by the given CxList.

Syntax

```
CxQL
public CxList FindByInitialization(CxList initializators)
```

Parameters

initializators

A CxList with initializers to search in "this" instance.

Return Value

A subset of "this" instance containing declarators initialized by the specified CxList.

Exceptions

Exception type	Condition
ArgumentNullException	**parameter is a null reference**

Comments

The return value may be empty (Count = 0).

Example

```
CxQL

 This example demonstrates the CxList.FindByInitialization() method.
 The input source code is:

 int b = 5;

CxList declarators = All.FindByType(typeof(Declarator));
result= declarators.FindByInitialization(All);

 the result would consist of 1 item:
            b
```

Version Information

Supported from v1.8.1

5.42 CxList.FindByLanguage Method (string)

Returns a CxList which is a subset of "this" instance whose elements are from the given language.

Syntax

```
CxQL
public CxList FindByLanguage (string languageName)
```

Parameters

languageName

Language name to search.

Return Value

A subset of "this" instance whose elements are from the given language.

Exceptions

Exception type	Condition
ArgumentNullException	**parameter is a null reference**

Comments

The return value may be empty (Count = 0).

Example

```
CxQL

 This example demonstrates the CxList.FindByLanguage() method.
 The input source code is:
 //file myCode.cs
 class myCode {

 }

 //file MyCode.java
 class MyCode {

 }

result = All.FindByLanguage ("Java");
 the result would consist of 1 item:
             myCode (class MyCode)
```

5.43 CxList.FindByMemberAccess Method (string)

Returns a CxList which is a subset of "this" instance where its elements are the ones that contains the given member being accessed , meaning that the given member must match the end of the element. Contains meaning that the end of member equal to given member. Notice that this is a case-sensitive search. For a non case-sensitive search, please use the `FindByMemberAccess Method (string, bool)` instead.

Syntax

```
CxQL
public CxList FindByMemberAccess(string memberAccess)
```

Parameters

memberAccess

Contains both the name of the type and the name of the accessed member in the qualified notation (eg. "CheckBoxList.SelectedValue"). Prefix and suffix wild card (*) are permitted.

Return Value

A subset of "this" instance where its elements are the ones which their given member is accessed.

Exceptions

Exception type	Condition
ArgumentNullException	**parameter is a null reference**

Comments

The return value may be empty (Count = 0).

Example

```
CxQL
```

```
This example demonstrates the CxList.FindByMemberAccess() method.
The input source code is:

MyClass a;
int b;
a.DataMember = 3;
b = a.Method();
result = All.FindByMemberAccess("MyClass.DataMember");
the result would consist of 1 item:
            a.DataMember (in a.DataMember = 3)

result = All.FindByMemberAccess("MyClass.Met*");

the result would consist of 1 item:
            a.Method (in b = a.Method())
```

5.44 CxList.FindByMemberAccess Method (string,bool)

Returns a CxList which is a subset of "this" instance where its elements are the ones that contains the given member being accessed, meaning that the given member must match the end of the element. This search allows both case-sensitive and non case-sensitive searches.

Syntax

```
CxQL
public CxList FindByMemberAccess(string memberAccess, bool caseSensitive)
```

Parameters

memberAccess

Contains both the name of the type and the name of the accessed member in qualified notation (eg. "CheckBoxList.SelectedValue"). Prefix and suffix wild card (*) are permitted.

caseSensitive

Boolean which indicates to the search to be (or not) case sensitive.

Return Value

A subset of "this" instance where its elements are the ones which their specified member is accessed.

Exceptions

Exception type	Condition
ArgumentNullException	**parameter is a null reference**

Comments

The return value may be empty (Count = 0).

Example

```
CxQL

This example demonstrates the CxList.FindByMemberAccess() method.
The input source code is:

MyClass a;
int b;
a.DataMember = 3;
b = a.Method();
```

```
result = All.FindByMemberAccess("MyClass.dataMember", true);
 Notice that the result would consist of 0 items because the search is case-
sensitive.

result = All.FindByMemberAccess("MyClass.dataMember", false);
 The result would consist of 1 item:
            a.DataMember (in a.DataMember = 3)

result = All.FindByMemberAccess("MyClass.met*", true);
 Notice that the result would consist of 0 items because the search is case-
sensitive.


result = All.FindByMemberAccess("MyClass.met*", false);
 the result would consist of 1 item:
           a.Method (in b = a.Method())
```

Version Information

Supported from v1.8.1

5.45 CxList.FindByMemberAccess Method (string,string)

Returns a CxList which is a subset of "this" instance where its elements are the ones that contains the given member being accessed, meaning that the given member must match the end of the element. This is a case-sensitive search by both the name of the type and the name of the accessed member. For a non case-sensitive search please use the `FindByMemberAccess Method(string, string, bool)` instead.

Syntax

```
CxQL
public CxList FindByMemberAccess(string typeName, string memberName)
```

Parameters

typeName

Contains the name of the accessed type (eg. "CheckBoxList");

memberName

Contains the name of the accessed member (eg. "SelectedValue");

Return Value

A subset of "this" instance where its elements are the ones which their specified member is accessed.

Exceptions

Exception type	Condition
ArgumentNullException	**parameter is a null reference**

Comments

The return value may be empty (Count = 0).

Example

```
CxQL

 This example demonstrates the CxList.FindByMemberAccess() method.
 The input source code is:
 MyClass a;
```

```
 int b;
 a.DataMember = 3;
 b = a.Method();
result = All.FindByMemberAccess("MyClass", "DataMember");

 The result would consist of 1 item:
             a.DataMember (in a.DataMember = 3)

result = All.FindByMemberAccess("MyClass", "Met*");

 The result would consist of 1 item:
             a.Method (in b = a.DataMethod())
```

Version Information

Supported from v7.9.0

5.46 CxList.FindByMemberAccess Method (string, string, bool)

Returns a CxList which is a subset of this instance where its elements are the ones that contains the given member being accessed, meaning that the given member must match the end of the element. This search allows both case-sensitive and non case-sensitive searches by the type name and the name of the accessed member.

Syntax

```
CxQL
public CxList FindByMemberAccess(string typeName, string memberName, bool
caseSensitive)
```

Parameters

typeName

Contains the name of the accessed type (eg. "CheckBoxList");

memberName

Contains the name of the accessed member (eg. "SelectedValue");

caseSensitive

Boolean which indicates to the search to be (or not) case sensitive.

Return Value

A subset of “this” instance where its elements are the ones which their specified member is accessed.

Exceptions

Exception type	Condition
ArgumentNullException	**parameter is a null reference**

Comments

The return value may be empty (Count = 0).

Example

```
CxQL

 This example demonstrates the CxList.FindByMemberAccess() method.
 The input source code is:
 MyClass a;
 int b;
```

```
 a.DataMember = 3;
 b = a.Method();
result = All.FindByMemberAccess("MyClass", "dataMember", true);

 the result would consist of 0 item because it is a case-sensitive search.

result = All.FindByMemberAccess("MyClass", "dataMember", false);

 the result would consist of 1 item:
            a.DataMember (in a.DataMember = 3)


result = All.FindByMemberAccess("MyClass", "met*", true);



the result would consist of 0 item, because it is a case-sensitive search.

result = All.FindByMemberAccess("MyClass", "met*", false);

the result would consist of 1 item:
            a.Method (in b = a.DataMethod())
```

5.47 CxList.FindByMemberAccesses Method (string[],bool)

Returns a CxList which is a subset of "this" instance where its elements are the ones that contains the given members being accessed, meaning that the given member must match the end of the element. This search allows both case-sensitive and non case-sensitive searches.

Syntax

```
CxQL
public CxList FindByMemberAccesses(string [] memberAccesses, bool caseSensitive =
true)
```

Parameters

memberAccesses

An array of strings where each contains both the name of the type and the name of the accessed member in qualified notation
(eg. "CheckBoxList.SelectedValue"). Prefix and suffix wild card (*) are permitted.

caseSensitive

Boolean which indicates to the search to be (or not) case sensitive. This Boolean is true by default

Return Value

A subset of "this" instance where its elements are the ones which their specified members are accessed.

Exceptions

Exception type	Condition
ArgumentNullException	**parameter is a null reference**

Comments

The return value may be empty (Count = 0).

Example

```
CxQL

 This example demonstrates the CxList.FindByMemberAccesses() method.
 The input source code is:

 MyClass a;
 int b;
 a.DataMember = 3;
 b = a.Method();
string []memberAcesses = new string[]{“MyClass.dataMember”, “MyClass.Met*”}
result = All.FindByMemberAccesses(memberAcesses, true);
 Notice that the result would consist of 1 item because the search is case-
sensitive: a.Method()

result = All.FindByMemberAccesses(memberAcesses);
 The result would consist of 2 items:
       a.DataMember
       a.Method
```

Version Information

Supported from 9.1.0

5.48 CxList.FindByExactMemberAccess Method (string)

Returns a CxList which is a subset of “this” instance where its elements are the ones that match the given member being accessed. Notice that this is a case-sensitive search. For a non case-sensitive search, please use the `FindByExactMemberAccess Method (string, bool)` instead.

Syntax

```
CxQL
public CxList FindByExactMemberAccess(string memberAccess)
```

Parameters

memberAccess

Contains both the name of the type and the name of the accessed member in the qualified notation (eg. "CheckBoxList.SelectedValue").

Return Value

A subset of “this” instance where its elements are the ones which their given member is accessed.

Exceptions

Exception type	Condition
ArgumentNullException	**parameter is a null reference**

Comments

The return value may be empty (Count = 0).

Example

```
CxQL

 This example demonstrates the CxList.FindByMemberAccess() method.
 The input source code is:
```

```
 MyClass a;
 int b;
 a.DataMember = 3;
 b = a.Method();
result = All.FindByExactMemberAccess("MyClass.DataMember");
 the result would consist of 1 item:
            a.DataMember (in a.DataMember = 3)
```

Version Information

Supported from v8.2.0

5.49 CxList.FindByExactMemberAccess Method (string,bool)

Returns a CxList which is a subset of "this" instance where its elements are the ones that match the given member being accessed. This search allows both case-sensitive and non case-sensitive searches.

Syntax

```
CxQL
public CxList FindByMemberAccess(string memberAccess, bool caseSensitive)
```

Parameters

memberAccess

Contains both the name of the type and the name of the accessed member in qualified notation (eg. "CheckBoxList.SelectedValue").

caseSensitive

Boolean which indicates to the search to be (or not) case sensitive.

Return Value

A subset of "this" instance where its elements are the ones which their specified member is accessed.

Exceptions

Exception type	Condition
ArgumentNullException	**parameter is a null reference**

Comments

The return value may be empty (Count = 0).

Example

```
CxQL

 This example demonstrates the CxList.FindByMemberAccess() method.
 The input source code is:

 MyClass a;
 int b;
 a.DataMember = 3;
 b = a.Method();
result = All.FindByExactMemberAccess("MyClass.dataMember", true);
 Notice that the result would consist of 0 items because the search is case-
sensitive.
```

```
result = All.FindByExactMemberAccess("MyClass.dataMember", false);
 The result would consist of 1 item:
            a.DataMember (in a.DataMember = 3)
```

Version Information

Supported from v8.2.0

5.50 CxList.FindByExactMemberAccess Method (string,string)

Returns a CxList which is a subset of "this" instance where its elements are the ones that match the given member being accessed. This is a case-sensitive search by both the name of the type and the name of the accessed member. For a non case-sensitive search please use the `FindByExactMemberAccess Method(string, string, bool)` instead.

Syntax

```
CxQL
public CxList FindByExactMemberAccess(string typeName, string memberName)
```

Parameters

typeName

Contains the name of the accessed type (eg. "CheckBoxList");

memberName

Contains the name of the accessed member (eg. "SelectedValue");

Return Value

A subset of "this" instance where its elements are the ones which their specified member is accessed.

Exceptions

Exception type	Condition
ArgumentNullException	**parameter is a null reference**

Comments

The return value may be empty (Count = 0).

Example

```
CxQL

 This example demonstrates the CxList.FindByMemberAccess() method.
 The input source code is:
 MyClass a;
 int b;
 a.DataMember = 3;
 b = a.Method();
result = All.FindByExactMemberAccess("MyClass", "DataMember");

 The result would consist of 1 item:
            a.DataMember (in a.DataMember = 3)
```

Version Information

Supported from v8.2.0

5.51 CxList.FindByExactMemberAccess Method (string, string, bool)

Returns a CxList which is a subset of this instance where its elements are the ones that match the given member being accessed. This search allows both case-sensitive and non case-sensitive searches by the type name and the name of the accessed member.

Syntax

```
CxQL
public CxList FindByExactMemberAccess(string typeName, string memberName, bool
caseSensitive)
```

Parameters

typeName

Contains the name of the accessed type (eg. "CheckBoxList");

memberName

Contains the name of the accessed member (eg. "SelectedValue");

caseSensitive

Boolean which indicates to the search to be (or not) case sensitive.

Return Value

A subset of "this" instance where its elements are the ones which their specified member is accessed.

Exceptions

Exception type	Condition
ArgumentNullException	**parameter is a null reference**

Comments

The return value may be empty (Count = 0).

Example

```
CxQL

 This example demonstrates the CxList.FindByMemberAccess() method.
 The input source code is:
 MyClass a;
 int b;
 a.DataMember = 3;
 b = a.Method();
result = All.FindByExactMemberAccess("MyClass", "dataMember", true);
  the result would consist of 0 item because it is a case-sensitive search.
result = All.FindByExactMemberAccess("MyClass", "dataMember", false);

 the result would consist of 1 item:
            a.DataMember (in a.DataMember = 3)
```

Version Information

Supported from v8.2.0

5.52 CxList.FindByMethodReturnType Method (string)

Returns a CxList which is a subset of "this" instance and its elements are method declarators of a given return type.

Syntax

```
CxQL
public CxList FindByMethodReturnType(string type)
```

Parameters

type

The return type name string.

Return Value

A subset of "this" instance with method declarators of a given return type.

Exceptions

Exception type	Condition
ArgumentNullException	**parameter is a null reference**

Comments

The return value may be empty (Count = 0).

Example

```
CxQL

 This example demonstrates the CxList.FindByMethodReturnType() method.
 The input source code is:

 MyType foo() {
       ...
 }

result = All.FindByMethodReturnType("MyType");

 the result would consists of 1 item:
           foo
```

5.53 CxList.FindByName Method (string)

Returns a CxList which is a subset of "this" instance and its elements are the ones which their name is the given parameter.

Syntax

```
CxQL
public CxList FindByName(string name)
```

Parameters

name

The name of the objects to look for. Prefix and postfix wildcard (*) are supported.

Return Value

A subset of "this" instance and its elements are the ones which their name is the given parameter.

Exceptions

Exception type	Condition
ArgumentNullException	**parameter is a null reference**

Comments

The return value may be empty (Count = 0).

Example

```
CxQL

 This example demonstrates the CxList.FindByName() method.
 The input source code is:

 MyClass a;
 int b;
 a.DataMember = 3;
 b = a.Method();

result = All.FindByName("*Member*");

 the result would consist of 1 item:
             a.DataMember (in a.DataMember = 3)
```

5.54 CxList.FindByName Method (string, int, int)

Returns a CxList which is a subset of "this" instance and its elements are the ones which their name is the given parameter (optionally with wildcards) and is not shorter than minLength and not longer than maxLength.

Syntax

```
CxQL
public CxList FindByName(string name, int minLength, int maxLength)
```

Parameters

name

Contains the name of the objects. Prefix and postfix wildcard (*) are supported.

minLength

Minimum length of the searched strings.

maxLength

Maximum length of the searched strings.

Result

A subset of "this" instance and its elements are the ones which their name is the given parameter, according to the given length interval.

Exceptions

Exception type	Condition
ArgumentNullException	**parameter is a null reference**

Comments

The return value may be empty (Count = 0).

Example

```
CxQL

 This example demonstrates the CxList.FindByName() method.
 The input source code is:

 MyClass a;
 int b;
 a.DataMember = 3;
```

```
 b = a.Method();

result = All.FindByName("*Me*",3,7);
 the result would consist of 1 item:
       Method (in b = a.Method())
```

Version Information

Supported from v2.0.5

5.55 CxList.FindByName Method (string, bool)

Returns a CxList which is a subset of "this" instance and its elements are the ones which their name is the given parameter, according to the specified comparison criteria.

Syntax

```
CxQL
public CxList FindByName(string name, bool caseSensitive)
```

Parameters

name

Contains the name of the objects. Prefix and postfix wildcard (*) are supported.

caseSensitive

Boolean which indicates to the search to be (or not) case sensitive.

Return Value

A subset of "this" instance and its elements are the ones which their name is the given parameter, according to the given comparison criteria. The caseSensitive boolean value defines the ability to search using case sensitive or case insensitive comparison.

Exceptions

Exception type	Condition
ArgumentNullException	**parameter is a null reference**

Comments

The return value may be empty (Count = 0).

Example

```
CxQL

 This example demonstrates the CxList.FindByName() method.
 The input source code is:

 MyClass a;
 int b;
 a.DataMember = 3;
 b = a.Method();

result = All.FindByName("*member*",true);
 the result would consist of 0 items.

result = All.FindByName("*member*", false);
 the result would consist of 1 item:
       a.DataMember (in a.DataMember = 3)
```

Version Information

Supported from v1.8.1

5.56 CxList.FindByName Method (string, StringComparison)

Returns a CxList which is a subset of "this" instance and its elements are the ones which their name is the given parameter. The comparison method specified in parameter is used for matching.

Syntax

```
CxQL
public CxList FindByName(string name, StringComparison comparisonType)
```

Parameters

name

The name of the objects to look for. Prefix and postfix wildcard (*) are supported.

comparisonType

StringComparison type to be used in name comparison. One of the following values:

CurrentCulture, CurrentCultureIgnoreCase, InvariantCulture, InvariantCultureIgnoreCase, Ordinal, OrdinalIgnoreCase

Return Value

A subset of "this" instance and its elements are the ones which their name is the given parameter.

Exceptions

Exception type	Condition
ArgumentNullException	**parameter is a null reference**

Comments

The return value may be empty (Count = 0).

Example

```
CxQL

 This example demonstrates the CxList.FindByName() method.
 The input source code is:

 MyClass a;
 int b;
 a.DataMember = 3;
 b = a.Method();

result = All.FindByName("*member*", StringComparison.OrdinalIgnoreCase);
 the result would consist of 1 item:
       DataMember (in a.DataMember = 3)
```

5.57 CxList.FindByName Method (CxList)

Returns a CxList which is a subset of "this" instance and its elements are the ones which their names are equal to the given list.

Syntax

```
CxQL
public CxList FindByName(CxList nodesList)
```

Parameters

nodesList

The list of nodes containing the names to be found.

Return Value

A subset of "this" instance and its elements are the ones which the name is contained in the given list.

Exceptions

Exception type	Condition
ArgumentNullException	**parameter is a null reference**

Comments

The return value may be empty (Count = 0).

Example

```
CxQL

This example demonstrates the CxList.FindByName() method.
The input source code is:

MyClass a;
int b;
a.DataMember = 3;
b = a.Method();

result = All.FindByName(All.FindByType(typeof(MemberAccess)));

the result would consist of 3 items:
      a (in MyClass a)
      a (in a.DataMember = 3)
      a (in b = a.Method())
```

5.58 CxList.FindByName Method (CxList, bool)

Returns a CxList which is a subset of "this" instance and its elements are the ones which their names are equal to the list given.

Syntax

```
CxQL
public CxList FindByName(CxList nodesList, bool CaseSensitive)
```

Parameters

nodesList

The list of nodes containing the names to be found.

CaseSensitive

Boolean which indicates to the search to be (or not) case sensitive.

Return Value

A subset of "this" instance and its elements are the ones which their name is contained in the given list, according to the specified case sensitivity comparison criteria.

Exceptions

Exception type	Condition
ArgumentNullException	**parameter is a null reference**

Comments

The return value may be empty (Count = 0).

Example

```
CxQL

 This example demonstrates the CxList.FindByName() method.
 The input source code is:

 MyClass A;
 int a;
 A.DataMember = 3;
 a = A.Method();

result = All.FindByName(All.FindByType(typeof(MemberAccess)), false);

 the result would consist of 5 items:
             A (in MyClass A)
             a (in int a)
             A (in A.DataMember = 3)
             a (in a = A.Method())
             A (in a = A.Method())
```

5.59 CxList.FindByParameterName(string)

Returns a CxList which is a subset of "this", containing only MethodInvokeExpr DOM node where their arguments are labeled according to the given value.

Syntax

```
CxQL
public CxList FindByParameterName (string paramName)
```

Parameters

paramName

String containing the name of the parameter belonging to the resultant methods.

Return Value

A subset of "this" instance where its elements are MethodInvokeExpr and contain arguments labelled according to 'paramName'.

Exceptions

Exception type	Condition
ArgumentNullException	**parameter is a null reference**

Comments

The return value may be empty (Count = 0).

Example

```
CxQL
```

```
 This example demonstrates the CxList. FindByParameterName(string) method.
 The input source code is:

 class NamedExample
{
    static void Main(string[] args)
    {
        PrintOrderDetails(sellerName:"Gift Shop",31,productName:"Red Mug");
    }
}

result = All.FindByParameterName ("sellerName");

 the result would consist in 1 item:
            PrintOrderDetails
```

5.60 CxList.FindByParameterName(string, int)

Returns a CxList which is a subset of "this", containing only MethodInvokeExpr DOM node where their arguments on a given position are labeled according to the given value.

Syntax

```
CxQL
public CxList FindByParameterName (string paramName, int paramPosition)
```

Parameters

paramName

String containing the name of the parameter belonging to the resultant methods.

paramPosition

Zero based index indicating the position of argument named 'paramName'.

Return Value

A subset of "this" instance where its elements are MethodInvokeExpr and contain arguments labelled according to 'paramName' in the indicated position by 'paramPosition'.

Exceptions

Exception type	Condition
ArgumentNullException	**parameter is a null reference**

Comments

The return value may be empty (Count = 0).

Example

```
CxQL

 This example demonstrates the CxList. FindByParameterName(string, int) method.
 The input source code is:

 class NamedExample
{
    static void Main(string[] args)
    {
        PrintOrderDetails(sellerName:"Gift Shop",31,productName:"Red Mug");
    }
}
```

```
result = All.FindByParameterName (“sellerName”, 1);

 would have no results because there’s no argument named “sellerName” on the
first position of the method call.
However,
result = All.FindByParameterName (“productName”, 1);

would result in 1 item:
            PrintOrderDetails
Because there’s an argument on the second position(zero based) called
“productName”
```

5.61 CxList.FindByParameters Method (CxList)

Returns a CxList which is a subset of “this” instance and its elements are methods of the given CxList with the specified parameters.

Syntax

```
CxQL
public CxList FindByParameters (CxList paramList)
```

Parameters

paramList

CxList of method parameters. GetArrayOfNodeIds

Return Value

A subset of “this” instance with methods whose parameters are given in the list.

Exceptions

Exception type	Condition
ArgumentNullException	**parameter is a null reference**

Remarks

The return value may be empty (Count = 0).

Example

```
CxQL

 This example demonstrates the CxList.FindByParameters() method.
 The input source code is:

 foo("myVar");

CxList var = All.FindByShortName("myVar");
result = All. FindByParameters(var);

 the result would consist of 1 item:
           foo
```

5.62 CxList.FindByParameterValue Method (int, string, BinaryOperator)

Returns a CxList which is a subset of "this" instance with methods where a given parameter number is equal (or not) to the specified value.

Syntax

```
CxQL
public CxList FindByParameterValue(int ParamNo, string ParamValue,
                        BinaryOperator opr)
```

Parameters

ParamNo

Zero-based index of the parameter

ParamValue

The value of the parameter

BinaryOperator

One of the followings values:

```
BinaryOperator.IdentityEquality
BinaryOperator.IdentityInequality
```

Return Value

Returns a CxList which is a subset of "this" instance with methods where a given parameter number is equal (or not) to the specified value.

Exceptions

Exception type	Condition
ArgumentNullException	**parameter is a null reference**

Remarks

The return value may be empty (Count = 0).

Example

```
CxQL

 This example demonstrates the CxList.FindByParameterValue() method.
 The input source code is:
 a = Method("Val1", 1);
 a = Method("val2", 2);
result = All.FindByParameterValue(0,"val1",BinaryOperator.IdentityEquality);
      the result would consist of 1 item:
            Method (in a = Method("Val1", 1))
result=All.FindByParameterValue(0,"val1",BinaryOperator.IdentityInequality);
      the result would consist of 1 item:
            Method (in a = Method("Val2", 2))
result=All.FindByParameterValue(1,"2",BinaryOperator.IdentityEquality);
      the result would consist of 1 item:
            Method (in a = Method("Val2", 2))
```

5.63 CxList.FindByParameterValue Method (int, string, BinaryOperator, bool)

Returns a CxList which is a subset of "this" instance with methods where a given parameter number is equal (or not) to the specified value.

Syntax

```
CxQL
public CxList FindByParameterValue(int ParamNo, string ParamValue,
                        BinaryOperator opr, bool useAbstractValue)
```

Parameters

ParamNo

Zero-based index of the parameter

ParamValue

The value of the parameter

BinaryOperator

One of the followings values:

`BinaryOperator.IdentityEquality`

`BinaryOperator.IdentityInequality`

useAbstractValue

Enable AbsInt when checking the parameter value (default : false)

Return Value

Returns a CxList which is a subset of "this" instance with methods where a given parameter number is equal (or not) to the specified value.

Exceptions

Exception type	Condition
ArgumentNullException	**parameter is a null reference**

Remarks

The return value may be empty (Count = 0).

Example

```
CxQL

 This example demonstrates the CxList.FindByParameterValue() method.
 The input source code is:
 a = Method("Val1", 1);
 a = Method("val2", 2);
result =
All.FindByParameterValue(0,"val1",BinaryOperator.IdentityEquality,true);
      the result would consist of 1 item:
            Method (in a = Method("Val1", 1))
result=All.FindByParameterValue(0,"val1",BinaryOperator.IdentityInequality,true)
;
      the result would consist of 1 item:
            Method (in a = Method("Val2", 2))
result=All.FindByParameterValue(1,"2",BinaryOperator.IdentityEquality,true);
      the result would consist of 1 item:
            Method (in a = Method("Val2", 2))
```

5.64 CxList.FindByParameterValue Method (int, int, BinaryOperator)

Returns a CxList which is a subset of "this" instance and its elements are methods whose parameters values (referred by their index) are equal (or not).

Syntax

```
CxQL
public CxList FindByParameterValue(int paramNo1, int paramNo2, BinaryOperator
opr)
```

Parameters

paramNo1

Zero-based index of the parameter.

paramNo2

Zero-based index of the parameter.

opr

One of the following values:

```
BinaryOperator.IdentityEquality
BinaryOperator.IdentityInequality
```

Return Value

A subset of "this" instance whose parameter values are equal or not equal (depending on the operator choosen).

Exceptions

Exception type	Condition
ArgumentNullException	**parameter is a null reference**

Remarks

The return value may be empty (Count = 0).

Example

```
CxQL

 This example demonstrates the CxList.GetParameters() method.
 The input source code is:

foo(1, i, 1);

CxList methods = All.FindByType(typeof(MethodInvokeExpr));
result = All. FindByParameterValue(0, 2, BinaryOperator.IdentityEquality);

 the result would consist of 1 item:
            foo (first parameter value is equal to the third one)
```

5.65 CxList.FindByPointerType Method (string, int, bool)

Returns a CxList which is a subset of "this" instance and its elements are of the type pointer of the specified type of code element

Syntax

```
CxQL
public CxList FindByPointerType(string type, int maxDepth, bool caseSensitive)
```

Parameters

type

type of the parameter

maxDepth

Zero-based maximum depth to look for. Default value is 0 meaning that it will look all the PointerTypeRef levels ultil it finds a TypeRef

caseSensitive

Default value is true

Return Value

A subset of "this" instance and its elements are of the type pointer of the specified type of code element.

Exceptions

Exception type	Condition
ArgumentNullException	**type is a null reference**

Remarks

The return value may be empty (Count = 0).

Example

```
CxQL

 This example demonstrates the CxList.FindByPointerType method.
 The input source code is:

Var i *int

result = All.FindByPointerType("int");

 the result would consist of 2 items:
             *int - pointer
              i - Declarator
```

Version Information

Supported from v8.5.0

5.66 CxList.FindByPointerType Method (string, bool)

Returns a CxList which is a subset of "this" instance and its elements are of the type pointer of the specified type of code element

Syntax

```
CxQL
public CxList FindByPointerType(string type, bool caseSensitive)
```

Parameters

type

type of the parameter

caseSensitive

Default value is true

Return Value

A subset of "this" instance and its elements are of the type pointer of the specified type of code element.

Exceptions

Exception type	Condition
ArgumentNullException	**type is a null reference**

Remarks

The return value may be empty (Count = 0).

Example

```
CxQL

 This example demonstrates the CxList.FindByPointerType method.
 The input source code is:

Var i *int

result = All.FindByPointerType("int");

 the result would consist of 2 items:
             *int - pointer
              I - Declarator
```

Version Information

Supported from v8.5.0

5.67 CxList.FindByPointerTypes Method (string[], int, bool)

Returns a CxList which is a subset of "this" instance and its elements are of the type pointer of the specified types of code element

Syntax

```
CxQL
public CxList FindByPointerType(string[] type, int maxDepth, bool caseSensitive)
```

Parameters

type

types of the parameter

maxDepth

Zero-based maximum depth to look for. Default value is 0 meaning that it will look all the PointerTypeRef levels ultil it finds a TypeRef

caseSensitive

Default value is true

Return Value

A subset of "this" instance and its elements are of the type pointer of the specified types of code element.

Exceptions

Exception type	Condition

ArgumentNullException	**type is a null reference**

Remarks

The return value may be empty (Count = 0).

Example

```
CxQL

 This example demonstrates the CxList.FindByPointerType method.
 The input source code is:

Var i *int

result = All.FindByPointerTypes(new string[]{“int”,”string”});

 the result would consist of 2 items:
             *int – pointer
              i - Declarator
```

Version Information

Supported from v8.5.0

5.68 CxList.FindByPointerTypes Method (string[], bool)

Returns a CxList which is a subset of “this” instance and its elements are of the type pointer of the specified types of code element

Syntax

```
CxQL
public CxList FindByPointerType(string[] type, bool caseSensitive)
```

Parameters

type

types of the parameter

caseSensitive

Default value is true

Return Value

A subset of “this” instance and its elements are of the type pointer of the specified types of code element.

Exceptions

Exception type	Condition
ArgumentNullException	**type is a null reference**

Remarks

The return value may be empty (Count = 0).

Example

```
CxQL

 This example demonstrates the CxList.FindByPointerType method.
 The input source code is:
```

```
Var i *int

result = All.FindByPointerTypes(new string[]{“int”,”string”});

 the result would consist of 2 items:
             *int – pointer
              i - Declarator
```

Version Information

Supported from v8.5.0

5.69 CxList.FindByPosition Method (int)

Returns a CxList which is a subset of “this” instance and its elements are in the given line number.

Syntax

```
CxQL
public CxList FindByPosition(int line)
```

Parameters

line

The line number.

Return Value

A subset of “this” instance with elements from the given line.

Exceptions

Exception type	Condition
ArgumentNullException	**parameter is a null reference**

Comments

The return value may be empty (Count = 0).

Example

```
CxQL

 This example demonstrates the CxList. FindByPosition() method.
 The input source code is:

 int b, a = 5;
 if (a > 3)
      b = 6;

result = All.FindByPosition(2);

 the result would consist of 4 items:
            if
            a,
            >,
            3
```

5.70 CxList.FindByPosition Method (int, int)

Returns a CxList which is a subset of "this" instance and its elements are located in the given line and column number.

Syntax

```
CxQL
public CxList FindByPosition(int line, int col)
```

Parameters

Line

Line number in the source code.

Col

Column number in the source code.

Return Value

A subset of "this" instance with elements from the given line and column.

Exceptions

Exception type	Condition
ArgumentNullException	**parameter is a null reference**

Comments

The return value may be empty (Count = 0).

Example

```
CxQL

 This example demonstrates the CxList.FindByPosition() method.
 The input source code is:

 MyClass a;
 int b;
 a.DataMember = 3;
 b = a.Method();

result = All.FindByPosition (3, 16);
 the result would consist of 1 item:
             3 (in a.DataMember = 3)
```

5.71 CxList.FindByPosition Method (int, int, int)

Returns a CxList which is a subset of "this" instance and its elements are in the given line/column and with the given length.

Syntax

```
CxQL
public CxList FindByPosition(int line, int col, int length)
```

Parameters

line

The line number.

col

The column number.

length

The element length.

Return Value

A subset of "this" instance with elements from the given line, column and with the given length.

Exceptions

Exception type	Condition
ArgumentNullException	**parameter is a null reference**

Comments

The return value may be empty (Count = 0).

Example

```
CxQL

 This example demonstrates the CxList. FindByPosition() method.
 The input source code is:

 int b, a = 5;
 if (a == 33)
      b = 6;

result = All.FindByPosition(2, 5, 1);

 the result would consist of 1 item:
            a
```

5.72 CxList.FindByPosition Method (string, int)

Returns a CxList which is a subset of "this" instance and its elements are located in the given file and line number.

Syntax

```
CxQL
public CxList FindByPosition(string file, int line)
```

Parameters

file

File name in the source code.

line

Line number in the source code.

Return Value

A subset of "this" instance which is located in the given file and line.

Exceptions

Exception type	Condition
ArgumentNullException	**parameter is a null reference**

Comments

The return value may be empty (Count = 0).

Example

```
CxQL

 This example demonstrates the CxList.FindByPosition() method.
 The input source code is (file name "Mycode.java"):

 MyClass a;
 int b;
 a.DataMember = 5;
 b = a.Method();

result = All.FindByPosition ("MyCode.java", 3);
 the result would consist of 1 item:
       5 (in a.DataMember = 5)
```

5.73 CxList.FindByPosition Method (string, int, int)

Returns a CxList which is a subset of "this" instance and its elements are located in the given file, line and column.

Syntax

```
CxQL
public CxList FindByPosition(string file, int line, int col)
```

Parameters

file

File name in the source code.

line

Line number in the source code.

col

Column number in the source code.

Return Value

A subset of "this" instance which is located in the given file, line and column.

Exceptions

Exception type	Condition
ArgumentNullException	**parameter is a null reference**

Comments

The return value may be empty (Count = 0).

Example

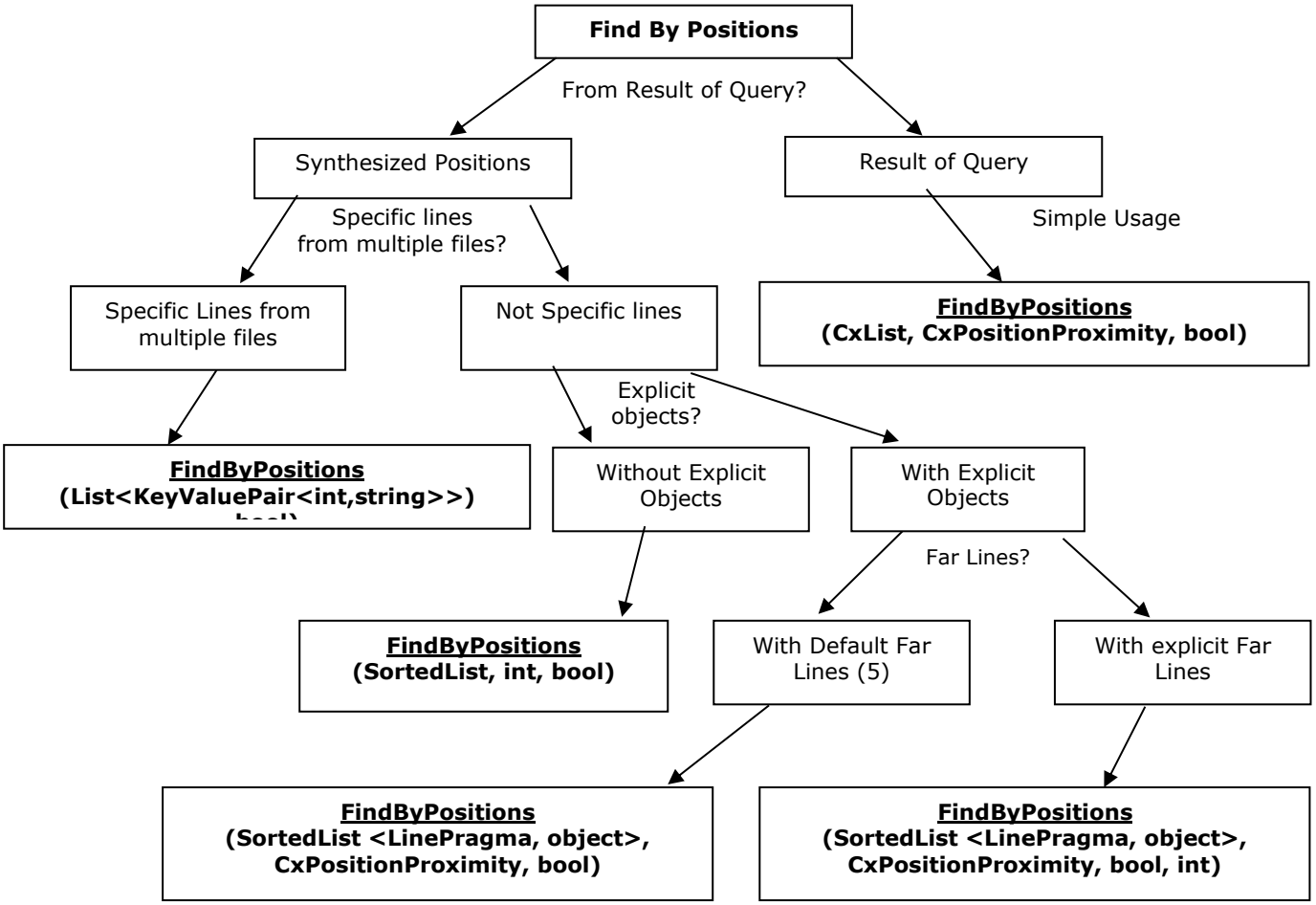
```
CxQL

 This example demonstrates the CxList.FindByPosition() method.
file name "Mycode.java"
 The input source code is:
 MyClass a;
 int b;
 a.DataMember = 5;
 b = a.Method();

result = All.FindByPosition ("MyCode.java", 3, 16);
 the result would be -
```

```
1 item found:
        5 (in a.DataMember = 5)
```

5.74 CxList.FindByPositions Methods

There are four methods (atomic queries) for using the "Find By Positions" method CxQL.

The recommended selection between the possible methods should be done according to the following tree:



5.74.1 CxList.FindByPositions Method (SortedList, int, bool)

Finds the elements of "this" instance at positions given in the pragmas list.

Syntax

```
CxQL
public CxList FindByPositions(SortedList pragmas, int extendMatch, bool oneOnly)
```

Parameters

pragmas

A sorted list containing the pragmas to match.

extendMatch

Defines the closeness of the matching results:

0 => ExactMatch: find exact match

1 => FindInLine: extend search to objects in closest position within same line

2 => FindClosestMatch: extend match to closest position within the same file

oneOnly

If true, it returns one result per position.

Return Value

The elements from "this" instance that are at the required positions.

Exceptions

Exception type	Condition
ArgumentNullException	**First parameter is a null reference**

Comments

The return value may be empty (Count = 0).

Example

```
CxQL

 This example demonstrates the CxList. FindByPositions() method.
 The input source code is:

 int b, a = 5;
 if (a == 33)
      b = 6;

CxList list = All.FindByShortName("b");
SortedList sorted = new SortedList(new PragmaComparer());
foreach (KeyValuePair<int, IGraph> dic in list.data)
{
       sorted.Add(dic.Value.LinePragma, null);
}
result = All.FindByPositions(sorted, 1, true);

the result would consist of 2 items:
         b (in int b)
         b (in b = 6)
```

5.74.2 CxList.FindByPositions Method (CxList, CxPositionProximity, bool)

Finds the elements of "this" instance at positions given in the list using the proximity given in parameter.

Syntax

```
CxQL
public CxList FindByPositions(CxList positions, CxPositionProximity extendMatch,
bool oneOnly)
```

Parameters

positions

A list containing the pragmas to match.

extendMatch

Defines the closeness of the matching results. One of the following values:

ExactMatch: find exact match

FindInLine: extend search to objects in closest position within same line

FindClosestMatch: extend match to closest position within the same file

oneOnly

If true, it returns one result per position.

Return Value

The elements of "this" instance that are at the given positions.

Exceptions

Exception type	Condition
ArgumentNullException	**First parameter is a null reference**

Comments

The return value may be empty (Count = 0).

Example

```
CxQL

 This example demonstrates the CxList. FindByPositions() method.
 The input source code is:
 int b, a = 5;
 if (a == 33)
      b = 6;

CxList list = All.FindByName("b");
result = All.FindByPositions(list, CxPositionProximity.FindInLine, false);

 the result would be all the elements in the 5 lines closer to lines that appear
variable b -
    2 items found
         b (in int b)
         b (in b = 6)
```

5.74.3 CxList.FindByPositions Method (SortedList<LinePragma,object>, CxPositionProximity, bool)

Finds the elements of "this" instance at positions given in the pragmas list using the proximity from the parameter.

Syntax

```
CxQL
public CxList FindByPositions(SortedList<LinePragma,object> pragmas,
CxPositionProximity extendMatch, bool oneOnly)
```

Parameters

pragmas

A sorted list containing the pragmas to match.

extendMatch

Defines the closeness of the matching results. One of the following values:

FindInLine: extend search to objects in closest position within same line.

FindClosestMatch: extend match to closest position within the same file.

ExactMatch: find exact match.

oneOnly

If true, it returns one result per position.

Return Value

The elements from the current instance that are at the given positions.

Exceptions

Exception type	Condition

ArgumentNullException	**parameter is a null reference**

Comments

The return value may be empty (Count = 0).

Example

```
CxQL

 This example demonstrates the CxList. FindByPositions() method.
 The input source code is:

 int b, a = 5;
 if (a == 33)
      b = 6;

CxList list = All.FindByName("b");
SortedList<LinePragma, object> sorted =
new SortedList<LinePragma, object>(new DataCollections.PragmaComparer());

foreach (KeyValuePair<int, IGraph> dic in list.data) {
       sorted.Add(dic.Value.LinePragma, null);
}

result = All.FindByPositions(sorted, CxList.CxPositionProximity.FindInLine,
true);

 the result would consist of 2 items:
        b (in int b)
        b (in b = 6)
```

5.74.4 CxList.FindByPositions Method (SortedList<LinePragma,object>, CxPositionProximity, bool, int)

Finds the elements of "this" instance at positions given in the pragmas list using the proximity given in parameter.

Syntax

```
CxQL
public CxList FindByPositions(SortedList<LinePragma,object> pragmas,
CxPositionProximity extendMatch, bool oneOnly, int farLines)
```

Parameters

pragmas

A sorted list containing the pragmas to match.

extendMatch

Defines the closeness of the matching results. One of the following values:

FindInLine: extend search to objects in closest position within same line.

FindClosestMatch: extend match to closest position within the same file.

ExactMatch: find exact match.

oneOnly

If true, it returns one result per position.

farLines

Acceptable line distance to look for (the default recomended setting is 5).

Return Value

The elements from "this" instance that are at the given positions.

Exceptions

Exception type	Condition
ArgumentNullException	**parameter is a null reference**

Remarks

The return value may be empty (Count = 0).

Example

```
This example demonstrates the CxList. FindByPositions() method.
 The input source code is:

 int b, a = 5;
 if (a == 33)
      b = 6;

CxList list = All.FindByName("b");
SortedList<LinePragma, object> sorted =
new SortedList<LinePragma, object>(new DataCollections.PragmaComparer());

foreach (KeyValuePair<int, IGraph> dic in list.data) {
       sorted.Add(dic.Value.LinePragma, null);
}

result = All.FindByPositions(sorted, CxList.CxPositionProximity.FindInLine, true,
5);

 the result would consist of 2 items:
         b (in int b)
         b (in b = 6)
```

5.74.5 CxList.FindByPositions Method (List<KeyValuePair<int, string>>)

Finds the elements of "this" instance at lines of files given in parameter.

Syntax

```
CxQL
public CxList FindByPositions(List<KeyValuePair<int, string>> lines)
```

Parameters

lines

A list of pairs line/filename to search the elements.

Return Value

The subset of elements from "this" instance that are in the files given at the lines requested.

Exceptions

Exception type	Condition
ArgumentNullException	**parameter is a null reference**

Remarks

The return value may be empty (Count = 0).

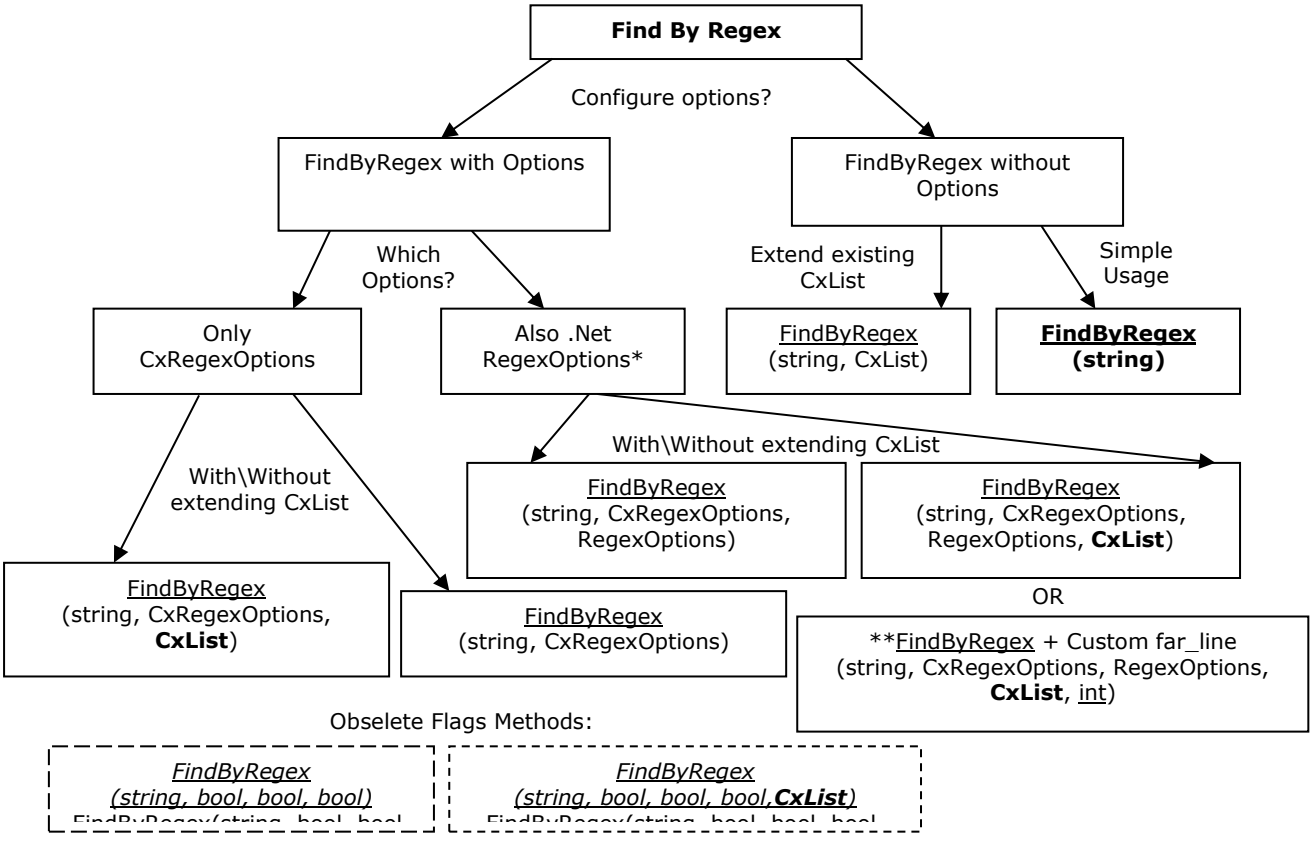
Example

```
CxQL

 This example demonstrates the CxList. FindByPositions() method.
 The input source code is (file name is “MyCode.cs”:

  int b, a = 5;
  if (a == 33)
      b = 6;

KeyValuePair<int,string> position= new
KeyValuePair<int,string>(3,”path\\MyCode.cs”);
List<KeyValuePair<int,string>> list = new List<KeyValuePair<int,string>>();
list.Add(position);
result = All.FindByPositions(list);

 the result would consist of 3 items:
            b
            =
            6
```

5.75 CxList.FindByRegex Methods

There are few methods (atomic queries) for using the "Find By Regex" algorithm in CxQL, some of them are obsolete and not recommended, and some of them are more comfortable according to the required parameters scenario.

The recommended selection between the possible methods should be done according to the following tree:



- Even without mentioning it explicitly in the parameter, the RegexOptions.**Multiline**, and RegexOptions.**Singleline** are always enabled in the Find-By-Regex algorithm in these queries.

- Customizing the FAR_LINES parameter is possible using the new method (the default value of this parameter is 5 and it is relevant for searching regex matches in comments).
- The full path (including namespaces) of the CxRegexOptions enum is CxList.CxRegexOptions.
- The full path (including namespaces) of the RegexOptions enum is System.Text.RegularExpressions.RegexOptions.

5.75.1 CxList.FindByRegex Method (string)

Returns a CxList which is a subset of this instance and its elements match the specified regular expression string.

This call is equivalent to the following calls and it is recommended to use the short call format by default:

- `FindByRegex(expression, null)`
- `FindByRegex(expression, CxRegexOptions.None)`
- `FindByRegex(expression, CxRegexOptions.None, RegexOptions.None)`
- `FindByRegex(expression, CxRegexOptions.None, RegexOptions.None, null)`
- `FindByRegex(expression, CxRegexOptions.None, RegexOptions.None, null, 5)`
- `FindByRegex(expression, false, true, false)`
- `FindByRegex(expression, false, true, false, null)`
- `FindByRegex(expression, CxRegexOptions.None, null)`

Syntax

```
CxQL
public CxList FindByRegex(string expression)
```

Parameters

expression

Regular expression string.

Return Value

A subset of this instance matches the given regular expression.

Exceptions

Exception type	Condition
ArgumentNullException	**parameter is a null reference**

Remarks

The return value may be empty (Count = 0).

Example

The following code example shows how you can use the FindByRegex method.

```
CxQL

 This example demonstrates the CxList.FindByRegex() method.
 The input source code is:

 int a = 5;
 if (a > 3)
     foo(a);

result = All.FindByRegex(@"(\s)?foo\(");

 the result would be -
      1 item found:
```

```
foo
```

Version Information

Supported from: **CxAudit** v1.8.1

5.75.2 CxList.FindByRegex Method (string, bool, bool, bool)

Returns a CxList which is a subset of this instance and its elements match the specified regular expression string, according to specified flag parameters.

This call is equivalent to the following calls and it is highly recommended to use the enum instead of the confusing flags:

- `FindByRegex(expression, searchInComments, searchInStringLiterals, recursive, null)`
- The 3 flags are translated to `CxRegexOptions` enum in the following way (bitmask supported):
  - `(false, false, false) => CxRegexOptions.DoNotSearchInStringLiterals`
  - `(false, false, true) => CxRegexOptions.DoNotSearchInStringLiterals | CxRegexOptions.AllowOverlaps`
  - `(false, true, false) => CxRegexOptions.None`
  - `(false, true, true) => CxRegexOptions.AllowOverlaps`
  - `(true, false, false) => CxRegexOptions.SearchInComments | CxRegexOptions.DoNotSearchInStringLiterals`
  - `(true, false, true) => CxRegexOptions.SearchInComments | CxRegexOptions.DoNotSearchInStringLiterals | CxRegexOptions.AllowOverlaps`
  - `(true, true, false) => CxRegexOptions.SearchInComments`
  - `(true, true, true) => CxRegexOptions.SearchInComments | CxRegexOptions.AllowOverlaps`

After translating the flags to `CxRegexOptions` enum this call is equivalent to the following calls:

- `FindByRegex(expression, cxRegexOptions)`
- `FindByRegex(expression, cxRegexOptions, RegexOptions.None)`
- `FindByRegex(expression, cxRegexOptions, RegexOptions.None, null)`
- `FindByRegex(expression, cxRegexOptions, RegexOptions.None, null, 5)`
- `FindByRegex(expression, cxRegexOptions, null)`

Syntax

```
CxQL
public CxList FindByRegex(string expression , bool searchInComments, bool
searchInStringLiterals, bool recursive)
```

Parameters

expression

Regular expression string.

searchInComments

Positive if searching inside comments is desired.

searchInStringLiterals

Positive if searching inside string literals is desired.

recursive

Positive if it is desired to allow regex matches to overlap.

Return Value

A subset of this instance matches the given regular expression according to the additional parameters.

Exceptions

Exception type	Condition
ArgumentNullException	**Expression parameter is a null reference**

Remarks

The return value may be empty (Count = 0).

Example

The following code example shows how you can use the FindByRegex method.

```
CxQL

 This example demonstrates the CxList.FindByRegex() method.
 The input source code is:

 int a = 5;
 if (a > 3)
     foo(a);

result = All.FindByRegex(@"(\s)?foo\(", false, true, false);

 the result would be -
      1 item found:
             foo
```

Version Information

Supported from v1.8.1

5.75.3 CxList.FindByRegex Method (string, bool, bool, bool, CxList)

Returns a CxList which is a subset of this instance and its elements match the specified regular expression string, according to specified flag parameters and fill the extended results parameter with the strings of the matches.

- The 3 flags are translated to `CxRegexOptions` enum in the following way (bitmask supported):
  - `(false, false, false) => CxRegexOptions.DoNotSearchInStringLiterals`
  - `(false, false, true) => CxRegexOptions.DoNotSearchInStringLiterals | CxRegexOptions.AllowOverlaps`
  - `(false, true, false) => CxRegexOptions.None`
  - `(false, true, true) => CxRegexOptions.AllowOverlaps`

- (true, false, false) =>
  CxRegexOptions.SearchInComments |
  CxRegexOptions.DoNotSearchInStringLiterals
- (true, false, true) =>
  CxRegexOptions.SearchInComments |
  CxRegexOptions.DoNotSearchInStringLiterals |
  CxRegexOptions.AllowOverlaps
- (true, true, false) => CxRegexOptions.SearchInComments
- (true, true, true) =>
  CxRegexOptions.SearchInComments | CxRegexOptions.AllowOverlaps

After translating the flags to CxRegexOptions enum this call is equivalent to the following calls:

(It is highly recommended to use the enum instead of the confusing flags)

- FindByRegex(expression, cxRegexOptions, RegexOptions.None, cxList)
- FindByRegex(expression, cxRegexOptions, RegexOptions.None, cxList, 5)
- FindByRegex(expression, cxRegexOptions, cxList)

Syntax

CxQL

```
public CxList FindByRegex(string expression , bool searchInComments, bool
searchInStringLiterals, bool recursive, CxList extendedResults)
```

Parameters

expression

Regular expression string.

searchInComments

Positive if searching inside comments is desired.

searchInStringLiterals

Positive if searching inside string literals is desired.

recursive

Positive if it is desired to allow regex matches to overlap.

extendedResults

extendedResults parameter is filled with the strings of the matches.

Return Value

A subset of this instance matches the given regular expression according to the additional parameters.

Exceptions

Exception type	Condition
ArgumentNullException	**Expression parameter is a null reference**

Remarks

The return value may be empty (Count = 0).

Example

The following code example shows how you can use the FindByRegex method.

CxQL

```
This example demonstrates the CxList.FindByRegex() method.
The input source code is:
```

```
int a = 5;
if (a > 3)
    foo(a);

result = All.FindByRegex(@"(\s)?foo\(", false, true, false, All.NewCxList());

the result would be -
     1 item found:
            foo
```

Version Information

Supported from v1.8.1

5.75.4 CxList.FindByRegex Method (string, CxList)

Returns a CxList which is a subset of this instance and its elements match the specified regular expression string, and fill the extended results parameter with the strings of the matches.

This query search source files with regex, and return the closest same line DOM object to the matches.

If no such object exists, returns the closest object in a successive line.

Search does not include searching inside comments and string literals, and regex matches are not allowed to overlap. The matching strings are returned in the extendedResults paramater.

This call is equivalent to the following calls:

- `FindByRegex(expression, CxRegexOptions.None, RegexOptions.None, cxList)`
- `FindByRegex(expression, CxRegexOptions.None, RegexOptions.None, cxList, 5)`
- `FindByRegex(expression, false, true, false, cxList)`
  - Using the Boolean flags option is not recommended, use the enums instead.
- `FindByRegex(expression, CxRegexOptions.None, cxList)`

Syntax

```
CxQL
public CxList FindByRegex(string expression , CxList extendedResults)
```

Parameters

expression

Regular expression string.

extendedResults

extendedResults parameter is filled with the strings of the matches.

Return Value

A subset of this instance matches the given regular expression according to the additional parameters.

Exceptions

Exception type	Condition
ArgumentNullException	**Expression parameter is a null reference**

Remarks

The return value may be empty (Count = 0).

Example

The following code example shows how you can use the FindByRegex method.

```
CxQL

 This example demonstrates the CxList.FindByRegex() method.
 The input source code is:

 int a = 5;
 if (a > 3)
     foo(a);

result = All.FindByRegex(@"(\s)?foo\(", All.NewCxList());

 the result would be -
      1 item found:
             foo
```

Version Information

Supported from v1.8.1

5.75.5 CxList.FindByRegex Method (string, CxRegexOptions)

Returns a CxList which is a subset of this instance and its elements match the specified regular expression string, according to specified Checkmarx Regex Options defined in the second parameter.

This call is equivalent to the following calls and it is recommended to use the short call format by default:

- `FindByRegex(expression, cxRegexOptions, RegexOptions.None)`
- `FindByRegex(expression, cxRegexOptions, RegexOptions.None, null)`
- `FindByRegex(expression, cxRegexOptions, RegexOptions.None, null, 5)`
- `FindByRegex(expression, cxRegexOptions, null)`

Syntax

```
CxQL
public CxList FindByRegex(string expression , CxRegexOptions cxOptions)
```

Parameters

expression

Regular expression string.

cxOptions

An enum matching the relevant CxRegexOptions which are:

None, SearchInComments, DoNotSearchInStringLiterals, AllowOverlaps and SearchOnlyInComments

Return Value

A subset of this instance matches the given regular expression according to the additional parameters.

Exceptions

Exception type	Condition
ArgumentNullException	**Expression parameter is a null reference**

Remarks

The return value may be empty (Count = 0).

Example

The following code example shows how you can use the FindByRegex method.

```
CxQL

 This example demonstrates the CxList.FindByRegex() method.
 The input source code is:

 int a = 5;
 if (a > 3)
     foo(a);

result = All.FindByRegex(@"(\s)?foo\(", CxList.CxRegexOptions.None);

 the result would be -
      1 item found:
             foo
```

Version Information

Supported from v1.8.1

5.75.6 CxList.FindByRegex Method (string, CxRegexOptions, CxList)

Returns a CxList which is a subset of this instance and its elements match the specified regular expression string, according to specified Checkmarx Regex Options defined in the second parameter, and also fill the extended results parameter with the strings of the matches.

This call is equivalent to the following calls and it is recommended to use the short call format by default:

- `FindByRegex(expression, cxRegexOptions, RegexOptions.None, cxList)`
- `FindByRegex(expression, cxRegexOptions, RegexOptions.None, cxList, 5)`

Syntax

```
CxQL
public CxList FindByRegex(string expression , CxRegexOptions cxOptions, CxList
extendedResults)
```

Parameters

expression

Regular expression string.

cxOptions

An enum matching the relevant CxRegexOptions which are:

None, SearchInComments, DoNotSearchInStringLiterals, AllowOverlaps and SearchOnlyInComments

extendedResults

extendedResults parameter is filled with the strings of the matches.

Return Value

A subset of this instance matches the given regular expression according to the additional parameters.

Exceptions

Exception type	Condition
ArgumentNullException	**Expression parameter is a null reference**

Remarks

The return value may be empty (Count = 0).

Example

The following code example shows how you can use the FindByRegex method.

```
CxQL

 This example demonstrates the CxList.FindByRegex() method.
 The input source code is:

 int a = 5;
 if (a > 3)
     foo(a);

result = All.FindByRegex(@"(\s)?foo\(", CxList.CxRegexOptions.None,
All.NewCxList());

 the result would be -
      1 item found:
            foo
```

Version Information

Supported from v1.8.1

5.75.7 CxList.FindByRegex Method (string, CxRegexOptions, RegexOptions)

Returns a CxList which is a subset of this instance and its elements match the specified regular expression string, according to specified Regex Options defined in the parameters (Checkmarx regex options and standard regex options).

This call is equivalent to the following calls and it is recommended to use the short call format by default:

- `FindByRegex(expression, cxRegexOptions, regexOptions, null)`
- `FindByRegex(expression, cxRegexOptions, regexOptions, null, 5)`

Syntax

```
CxQL
public CxList FindByRegex(string expression , CxRegexOptions cxOptions,
RegexOptions regularOptions)
```

Parameters

expression

Regular expression string.

cxOptions

An enum matching the relevant CxRegexOptions which are:

None, SearchInComments, DoNotSearchInStringLiterals, AllowOverlaps and SearchOnlyInComments

regularOptions

Options to add to the regular expression (case sensitivity, etc.)

In addition to the user-defined regular-expression-options in this arguments, the alogrith also uses the following regex-options by default: `RegexOptions.Multiline, RegexOptions.Singleline.`

Return Value

A subset of this instance matches the given regular expression according to the additional parameters.

Exceptions

Exception type	Condition
ArgumentNullException	**Expression parameter is a null reference**

Remarks

The return value may be empty (Count = 0).

Example

The following code example shows how you can use the FindByRegex method.

```
CxQL

 This example demonstrates the CxList.FindByRegex() method.
 The input source code is:

 int a = 5;
 if (a > 3)
     foo(a);

result = All.FindByRegex(@"(\s)?foo\(", CxList.CxRegexOptions.None,
System.Text.RegularExpressions.RegexOptions.None);

 the result would be -
      1 item found:
             foo
```

Version Information

Supported from v1.8.1

5.75.8 CxList.FindByRegex Method (string, CxRegexOptions, RegexOptions, CxList)

Returns a CxList which is a subset of this instance and its elements match the specified regular expression string, according to specified Regex Options defined in the parameters (Checkmarx regex options and standard regex options), and also fill the extended results parameter with the strings of the matches.

This call is equivalent to the following call and it is recommended to use the short call format by default:

- `FindByRegex(expression, cxRegexOptions, regexOptions, cxList, 5)`

Syntax

```
CxQL
public CxList FindByRegex(string expression , CxRegexOptions cxOptions,
RegexOptions regularOptions, CxList extendedResults)
```

Parameters

expression

Regular expression string.

cxOptions

An enum matching the relevant CxRegexOptions which are:

None, SearchInComments, DoNotSearchInStringLiterals, AllowOverlaps and SearchOnlyInComments

regularOptions

Options to add to the regular expression (case sensitivity, etc.)

In addition to the user-defined regular-expression-options in this arguments, the alogrith also uses the following regex-options by default: `RegexOptions.Multiline, RegexOptions.Singleline`.

extendedResults

extendedResults parameter is filled with the strings of the matches.

Return Value

A subset of this instance matches the given regular expression according to the additional parameters.

Exceptions

Exception type	Condition
ArgumentNullException	**Expression parameter is a null reference**

Remarks

The return value may be empty (Count = 0).

Example

The following code example shows how you can use the FindByRegex method.

```
CxQL

 This example demonstrates the CxList.FindByRegex() method.
 The input source code is:

 int a = 5;
 if (a > 3)
     foo(a);

result = All.FindByRegex(@"(\s)?foo\(", CxList.CxRegexOptions.None,
System.Text.RegularExpressions.RegexOptions.None, All.NewCxList());

 the result would be -
      1 item found:
             foo
```

Version Information

Supported from v1.8.1

5.75.9 CxList.FindByRegex Method (string, CxRegexOptions, RegexOptions, CxList, int, CxPositionSearchDirection)

Returns a CxList which is a subset of this instance and its elements match the specified regular expression string, according to specified Regex Options defined in the parameters (Checkmarx regex options and standard regex options), and also fill the extended results parameter with the strings of the matches.

Also get a customized far-lines parameter to be considered as acceptable lines distance when looking for regex in comments.

All the other calls to "FindByRegex.." with\without different parameters lead in the end to this specific method.

Syntax

```
CxQL
public CxList FindByRegex(string expression , CxRegexOptions cxOptions,
RegexOptions regularOptions, CxList extendedResults, int farLines,
CxPositionSearchDirection searchDirection )
```

Parameters

expression

Regular expression string.

cxOptions

An enum matching the relevant CxRegexOptions which are:

None, SearchInComments, DoNotSearchInStringLiterals, AllowOverlaps and SearchOnlyInComments

regularOptions

Options to add to the regular expression (case sensitivity, etc.)

In addition to the user-defined regular-expression-options in this arguments, the alogrith also uses the following regex-options by default: `RegexOptions.`Multiline, `RegexOptions.`Singleline.

extendedResults

extendedResults parameter is filled with the strings of the matches.

farLines

Configure the line distance to look for regex matches in comments (it is 5 lines by default).

searchDirection

Determines the search direction that can be one of the following values: Default, Backward, Forward. The Backward and Forward values means that the search is for the CxList which is a subset of the instance that is the last one before the regular expression or just the first one after, respectively. The default search (that is the default value of the parameter) just compares the distance between both (in manner of Line distance and column distance) and chooses the one that is the closest between the two.

Return Value

A subset of this instance matches the given regular expression according to the additional parameters.

Exceptions

Exception type	Condition
ArgumentNullException	**Expression parameter is a null reference**

Remarks

The return value may be empty (Count = 0).

Example

The following code example shows how you can use the FindByRegex method.

```
CxQL

 This example demonstrates the CxList.FindByRegex() method.
 The input source code is:

 int a = 5;
 if (a > 3)
     foo(a);

result = All.FindByRegex(@"(\s)?foo\(", CxList.CxRegexOptions.None,
System.Text.RegularExpressions.RegexOptions.None, All.NewCxList(), 5);

 the result would be -
      1 item found:
            foo
```

Version Information

Supported from v1.8.1

5.75.10 CxList.FindByRegexSecondOrder Method (string, CxList)

Filters a CxList of Comments DOM objects according to a check of whether a Comment object contain a match to the provided regex expression, and returns closest DOM object to those that pass the filter.

Used in C\C++ MISRA Preset queries in order to validate comments style.

Syntax

```
CxQL
public CxList FindByRegexSecondOrder(string expression , CxList extendedResults)
```

Parameters

expression

Regular expression search string.

inputList

The comments CxList that's should be filtered.

Return Value

A subset of this instance matches the given regular expression according to the additional parameters.

Exceptions

Exception type	Condition
ArgumentNullException	**Expression parameter is a null reference**

Remarks

The return value may be empty (Count = 0).

Example

The following code example shows how you can use the FindByRegexSecondOrder method

```
CxQL

 This example demonstrates the CxList.FindByRegexSecondOrder() method.
 The input source code is taken from MISRA Code_Commented_Out query:

/* Function comment is compliant. * /
void mc2_0202 ( void )
{
use_int32(0);   // Comment Not Compliant
}
*/

// Find all comments ending with } or ;
CxList extendedResult = All.NewCxList();

// All /* */ comments
CxList res = All.FindByRegex(@"/\*.*?\*/", true, false, false, extendedResult);

// Search results for } or ; at end of comment
result = All.FindByRegexSecondOrder(@"[;{}]\s*\*/", extendedResult);
The result will be the commented out function which is found out by this regex
```

Version Information

Supported from v1.8.1

5.76 CxList.FindByRegexExt Methods

Find by regular expression in all files of the project regardless of DOM and language.

Remarks

The results are not related to DOM so they can't be compared to DOM objects returned by other functions. Results can't be used as parameters to other queries.

5.76.1 CxList.FindByRegexExt Method (string)

Syntax

```
CxQL
public CxList FindByRegexExt(string pattern)
```

Parameters

Pattern

Regular expression pattern

Return Value

A list of matches for given regular expression in all project files.

Remarks

The return value may be empty (Count = 0).

Example

The following code example shows how you can use the FindByRegexExt method.

```
CxQL

 This example demonstrates the CxList.FindByRegexExt() method.
 The input source code is:

 int a = 5;
 if (a > 3)
     foo(a);
 else
     FOO(a);

// foo(a)
/* foo */

result = All.FindByRegexExt(@"(\s)?foo");

 the result would be -
      3 items found:
             foo
             // FOO
             /* foo
```

Version Information

Supported from version 7.1.8 and 7.1.6HF5

5.76.2 CxList.FindByRegexExt Method (string, string)

Syntax

```
CxQL
public CxList FindByRegexExt(string pattern, string fileMask)
```

Parameters

Pattern

Regular expression pattern

fileMask

File mask for search. Control characters "*" and "?" are supported.

Return Value

A list of matches for given regular expression in all project files.

Remarks

The return value may be empty (Count = 0).

Example

The following code example shows how you can use the FindByRegexExt method.

```
CxQL

 This example demonstrates the CxList.FindByRegexExt() method.
 The input source code is:

 int a = 5;
 if (a > 3)
     foo(a);
 else
     FOO(a);

// foo(a)
/* foo */

result = All.FindByRegexExt(@"(\s)?foo");

 the result would be -
      3 items found:
             foo
             // FOO
             /* foo
```

Version Information

Supported from version 7.1.8 and 7.1.6HF5

5.76.3 CxList.FindByRegexExt Method (string, string, bool)

Syntax

```
CxQL
public CxList FindByRegexExt(string pattern, string fileMask, bool
searchInComments)
```

Parameters

expression

Regular expression pattern

fileMask – optional

File mask for search. Control characters "*" and "?" are supported.

For example: "*.*" looks in all files and "*.aspx" looks in aspx files.

searchInComments – optional

Allow or not search in comments

Return Value

A list of matches for given regular expression in choosen project files including or excluding results in comments.

Remarks

The return value may be empty (Count = 0).

Default values relevant only from version 7.1.8.

Example

The following code example shows how you can use the FindByRegexExt method.

```
CxQL

 This example demonstrates the CxList.FindByRegexExt() method.
 The input source code is:

 int a = 5;
 if (a > 3)
     foo(a);
 else
     FOO(a);

// foo(a)
/* foo */

result = All.FindByRegexExt(@"(\s)?foo","*.cs",false, RegexOptions.IgnoreCase);

 the result would be -
      1 item found:
             foo
```

Version Information

Supported from version 7.1.8 and 7.1.6HF5

5.76.4 CxList.FindByRegexExt Method (string, string, bool, RegexOptions)

Syntax

```
CxQL
public CxList FindByRegexExt(string pattern, string fileMask = "*.*", bool
searchInComments = true, RegexOptions regularOptions = RegexOptions.None)
```

Parameters

expression

Regular expression pattern

fileMask – optional

Default value: "*.*".

File mask for search. Control characters "*" and "?" are supported.

For example: "*.*" looks in all files and "*.aspx" looks in aspx files.

searchInComments – optional

Default value: true.

Allow or not search in comments

regularOptions – optional

Default value: RegexOptions.None.

Options for regular expression build from first parameter - **pattern**

Return Value

A list of matches for given regular expression in choosen project files including or excluding results in comments with regex build with specified options.

Remarks

The return value may be empty (Count = 0).

Default values relevant only from version 7.1.8.

Example

The following code example shows how you can use the FindByRegexExt method.

```
CxQL

 This example demonstrates the CxList.FindByRegexExt() method.
 The input source code is:

 int a = 5;
 if (a > 3)
     foo(a);
 else
     FOO(a);

// foo(a)
/* foo */

result = All.FindByRegexExt(@"(\s)?foo","*.cs",false, RegexOptions.IgnoreCase);

 the result would be -
      2 item found:
             foo
             FOO
```

Version Information

Supported from version 7.1.8 and 7.1.6HF5

5.76.5 CxList.FindByRegexExt Method (string, string, bool, CxRegexOptions ,RegexOptions)

Syntax

```
CxQL
public CxList FindByRegexExt(string pattern, string fileMask = "*.*", bool
searchInComments = true, CxRegexOptions cxOptions = CxRegexOptions.None,
RegexOptions regularOptions = RegexOptions.None)
```

Parameters

expression

Regular expression pattern

fileMask – optional

Default value: "*.*".

File mask for search. Control characters "*" and "?" are supported.

For example: "*.*" looks in all files and "*.aspx" looks in aspx files.

searchInComments – optional

Default value: true.

Allow or not search in comments

cxOptions

An enum matching the relevant CxRegexOptions which are:

None, SearchInComments, DoNotSearchInStringLiterals, AllowOverlaps and SearchOnlyInComments

regularOptions – optional

Default value: RegexOptions.None.

Options for regular expression build from first parameter - **pattern**

Return Value

A list of matches for given regular expression in choosen project files including or excluding results in comments with regex build with specified options.

Remarks

The return value may be empty (Count = 0).

Default values relevant only from version 7.1.8.

Example

The following code example shows how you can use the FindByRegexExt method.

```
CxQL

 This example demonstrates the CxList.FindByRegexExt() method.
 The input source code is:

 int a = 5;
 if (a > 3)
     foo(a);
 else
     FOO(a);

// foo(a)
/* foo */

result = All.FindByRegexExt(@"(\s)?foo","*.cs",false, CxRegexOptions.None,
RegexOptions.IgnoreCase);

 the result would be -
      2 items found:
             foo
             FOO
```

Version Information

Supported from version 7.1.8 and 7.1.6HF5

5.76.6 CxList.FindByRegexExt Method (string, string, CxRegexOptions)

Syntax

```
CxQL
```

```
public CxList FindByRegexExt(string pattern, string fileMask, CxRegexOptions
cxOptions)
```

Parameters

pattern

Regular expression pattern

fileMask

File mask for search. Control characters "*" and "?" are supported.

For example: "*.*" looks in all files and "*.aspx" looks in aspx files.

cxOptions

An enum matching the relevant CxRegexOptions which are:

None, SearchInComments, DoNotSearchInStringLiterals, AllowOverlaps and SearchOnlyInComments

Return Value

A list of matches for given regular expression in choosen project files including or excluding results in comments with regex build with specified options.

Remarks

The return value may be empty (Count = 0).

Default values relevant only from version 7.1.8.

Example

The following code example shows how you can use the FindByRegexExt method.

```
CxQL

 This example demonstrates the CxList.FindByRegexExt() method.
 The input source code is:

 int a = 5;
 if (a > 3)
     foo(a);
 else
     FOO(a);

// foo(a)
/* foo */

result = All.FindByRegexExt(@"(\s)?foo","*.cs", RegexOptions.IgnoreCase);

 the result would be -
      2 items found:
             foo
              FOO
```

Version Information

Supported from version 7.1.8 and 7.1.6HF5

5.76.7 CxList.FindByRegexExt Method (string, string, CxRegexOptions, RegexOptions)

Syntax

```
CxQL
```

```
public CxList FindByRegexExt(string pattern, string fileMask = "*.*",
CxRegexOptions cxOptions = CxRegexOptions.None, RegexOptions regularOptions =
RegexOptions.None)
```

Parameters

expression

Regular expression pattern

fileMask – optional

Default value: "*.*".

File mask for search. Control characters "*" and "?" are supported.

For example: "*.*" looks in all files and "*.aspx" looks in aspx files.

cxOptions – optional

An enum matching the relevant CxRegexOptions which are:

None, SearchInComments, DoNotSearchInStringLiterals, AllowOverlaps and SearchOnlyInComments

regularOptions – optional

Default value: RegexOptions.None.

Options for regular expression build from first parameter - **pattern**

Return Value

A list of matches for given regular expression in choosen project files including or excluding results in comments with regex build with specified options.

Remarks

The return value may be empty (Count = 0).

Default values relevant only from version 7.1.8.

Example

The following code example shows how you can use the FindByRegexExt method.

```
CxQL

 This example demonstrates the CxList.FindByRegexExt() method.
 The input source code is:
 int a = 5;
 if (a > 3)
     foo(a);
 else
     FOO(a);

// foo(a)
/* foo */

result = All.FindByRegexExt(@"(\s)?foo","*.cs",false, RegexOptions.IgnoreCase);

 the result would be -
      2 item found:
             foo
             FOO
```

Version Information

Supported from version 7.1.8 and 7.1.6HF5

5.76.8 CxList.FindByRegexExt Method (string, List<string>, bool, CxRegexOptions, RegexOptions)

Syntax

```
CxQL
public CxList FindByRegexExt(string expression, List<string> fileMaskList, bool
searchInComments = true, CxRegexOptions cxOptions =
CxRegexOptions.SearchInComments, RegexOptions regularOptions = RegexOptions.None)
```

Parameters

expression

Regular expression pattern

fileMaskList

List of File masks for search. Control characters "*" and "?" are supported.

For example: "*.*" looks in all files and "*.aspx" looks in aspx files.

searchInComments – optional

Default value: true.

Allow or not search in comments

cxOptions - optional

An enum matching the relevant CxRegexOptions which are:

None, SearchInComments, DoNotSearchInStringLiterals, AllowOverlaps and SearchOnlyInComments

regularOptions – optional

Default value: RegexOptions.None.

Options for regular expression build from first parameter - **pattern**

Return Value

A list of matches for given regular expression in choosen project files including or excluding results in comments with regex build with specified options.

Remarks

The return value may be empty (Count = 0).

Default values relevant only from version 7.1.8.

Example

The following code example shows how you can use the FindByRegexExt method.

```
CxQL

 This example demonstrates the CxList.FindByRegexExt() method.
 The input source code is:

 int a = 5;
 if (a > 3)
     foo(a);
 else
     FOO(a);
// foo(a)
/* foo */

result = All.FindByRegexExt(@"(\s)?foo",new List<string>{"*.cs", "*.js"}, false,
CxRegexOptions.SearchInComments, RegexOptions.IgnoreCase);

 the result would be -
```

```
      2 item found:
            foo
            FOO
```

Version Information

Supported from version 8.0.0

5.77 CxList.FindByReturnType Method (string)

Returns a CxList which is a subset of this instance and its elements are of the specified type.

Syntax

```
CxQL
public CxList FindByReturnType(String Type, bool stripPointerAndRefFromReturnType
= true)
```

Parameters

Type

The type of the objects to be found

stripPointerAndRefFromReturnType

true – the result will include methods that return Type* as well as methods that return Type

Return Value

A subset of this instance and its elements are of the specified return type.

Exceptions

Exception type	Condition
ArgumentNullException	**parameter is a null reference**

Remarks

The return value may be empty (Count = 0).

Example

The following code example shows how you can use the FindByReturnType method.

```
CxQL

 This example demonstrates the CxList.FindByReturnType() method.
 The input source code is:
public class a
{
       int bla()
       {
              int b, a = 5;
               if (a == 33)
                      b = 6;
           return b;
      }
}
result = All.FindByReturnType ("int");
 the result would be -
      1 items found:
            bla() (in int bla())
```

Version Information

Supported from v1.8.1

5.78 CxList.FindByShortName Method (string)

Returns a CxList which is a subset of this instance and its elements are the ones which their short name is the specified string.

Syntax

```
CxQL
public CxList FindByShortName(string Name)
```

Parameters

Name

The short name of the objects to look for. Prefix and postfix wildcard (*) are supported.

Return Value

A subset of this instance and its elements are the ones which their name is the specified string.

Exceptions

Exception type	Condition
ArgumentNullException	**parameter is a null reference**

Remarks

The return value may be empty (Count = 0).

Example

The following code example shows how you can use the FindByShortName method.

```
CxQL

 This example demonstrates the CxList.FindByShortName() method.
 The input source code is:

 MyClass a;
 int b;
 a.DataMember = 3;
 b = a.Method();

result = All.FindByShortName("Method");

 the result would be -
      1 item found:
             Method ( in b = a.Method() )
```

Version Information

Supported from v1.8.1

5.79 CxList.FindByShortName Method (string, bool)

Returns a CxList which is a subset of this instance and its elements are the ones which their short name is the specified string, according to the specified comparison criteria.

Syntax

```
CxQL
public CxList FindByName(string ShortName, bool caseSensitive)
```

Parameters

ShortName

Contains the short name of the objects. Prefix and postfix wildcard (*) are supported.

caseSensitive

Boolean which indicates to the search to be (or not) case sensitive.

Return Value

A subset of this instance and its elements are the ones which their short name is the specified string, according to the specified comparison criteria. Where the caseSensitive value can be true for case sensitive and false for case insensitive.

Exceptions

Exception type	Condition
ArgumentNullException	**parameter is a null reference**

Remarks

The return value may be empty (Count = 0).

Example

The following code example shows how you can use the FindByShortName method.

```
CxQL

 This example demonstrates the CxList.FindByShortName() method.
 The input source code is:

 MyClass a;
 int b;
 a.DataMember = 3;
 b = a.Method();
result = All.FindByShortName("method",true);
 the result would be -
      0 items found

result = All.FindByShortName("method", false);

 the result would be -
      1 item found:
            a.Method (in b = a.Method() )
```

Version Information

Supported from v1.8.1

5.80 CxList.FindByShortNames Method (List<string>)

Returns a CxList which is a subset of this instance and its elements are the ones which their short name is the specified list of strings.

Syntax

```
CxQL
public CxList FindByShortNames(List<string> nodeNames)
```

Parameters

nodeNames

The short names of the objects to look for. Prefix and postfix wildcard (*) are supported.

Return Value

A subset of this instance and its elements are the ones which their name listed in specified list of strings.

Exceptions

Exception type	Condition
ArgumentNullException	**parameter is a null reference**

Remarks

The return value may be empty (Count = 0). Works afficient if wildcard not present.

Example

The following code example shows how you can use the FindByShortNames method.

```
CxQL

 This example demonstrates the CxList.FindByShortNames() method.
 The input source code is:

 MyClass a;
 int b;
 a.DataMember = 3;
 b = a.Method();
 c = a.Method1()

result = All.FindByShortNames(new List<string> {"Method",”Method1”});

 the result would be -
      2 item found:
            Method  ( in b = a.Method() )
            Method1 ( in c = a.Method1() )
```

Version Information

Supported from v7.1.8

5.81 CxList.FindByShortNames Method (List<string>, bool)

Returns a CxList which is a subset of this instance and its elements are the ones which their short name is the specified string, according to the specified comparison criteria.

Syntax

```
CxQL
public CxList FindByNames(List<string> nodeNames, bool caseSensitive)
```

Parameters

nodeNames

Contains the short name of the objects. Prefix and postfix wildcard (*) are supported.

caseSensitive

Boolean which indicates to the search to be (or not) case sensitive.

Return Value

A subset of this instance and its elements are the ones which their short name is the specified string, according to the specified comparison criteria. Where the caseSensitive value can be true for case sensitive and false for case insensitive.

Exceptions

Exception type	Condition
ArgumentNullException	**parameter is a null reference**

Remarks

The return value may be empty (Count = 0). Works afficient if wildcard not present.

Example

The following code example shows how you can use the FindByShortName method.

```
CxQL

 This example demonstrates the CxList.FindByShortNames() method.
 The input source code is:

 MyClass a;
 int b;
 a.DataMember = 3;
 b = a.Method();
 c = a.method1();

result = All.FindByShortNames(new List<string> {"method","Method1"}, true);
 the result would be -
      1 items found
             c = a.method1();

result = All.FindByShortNames(new List<string> {"method","Method1"},false);

 the result would be -
      2 item found:
             a.Method  (in b = a.Method() )
             a.method1 (in c = a.method1 () )
```

Version Information

Supported from v7.1.8

5.82 CxList.FindByShortName Method (CxList)

Returns a CxList which is a subset of this instance and its elements are the ones which their short name is the specified string.

Syntax

```
CxQL
public CxList FindByShortName(CxList nodesList)
```

Parameters

nodesList

The short name of the objects to look for. Prefix and postfix wildcard (*) are supported.

Return Value

A subset of this instance and its elements are the ones which their name is the specified string.

Exceptions

Exception type	Condition
ArgumentNullException	**parameter is a null reference**

Remarks

The return value may be empty (Count = 0).

Example

The following code example shows how you can use the FindByShortName method.

```
CxQL

 This example demonstrates the CxList.FindByShortName() method.
 The input source code is:

    class Program
    {
        static void Main(string[] args)
        {
              Customer c = new customer();
        }
    }
class Customer{}
class User{}
CxList classes = All.FindByType(typeof(ClassDecl));
CxList types = All.FindByType(typeof(TypeRef));
CxList classesWithInstances = classes - classes.FindByShortName(types);

 the result would be -
      3 item found:
            Customer ( in class Customer{})
             Program ( in class Program)
              User ( in class User{})
```

Version Information

Supported from v1.8.1

5.83 CxList.FindByShortName Method (CxList, bool)

Returns a CxList which is a subset of this instance and its elements are the ones which their short name is the specified string, according to the specified comparison criteria.

Syntax

```
CxQL
public CxList FindByShortName(CxList nodesList, bool caseSensitive)
```

Parameters

nodesList

Contains the short name of the objects. Prefix and postfix wildcard (*) are supported.

caseSensitive

Boolean which indicates to the search to be (or not) case sensitive.

Return Value

A subset of this instance and its elements are the ones which their short name is the specified string, according to the specified comparison criteria. Where the csaeSensitive value can be true for case sensitive and false for case insensitive.

Exceptions

Exception type	Condition

ArgumentNullException	**parameter is a null reference**

Remarks

The return value may be empty (Count = 0).

Example

The following code example shows how you can use the FindByShortName method.

```
CxQL

 This example demonstrates the CxList.FindByShortName() method.
 The input source code is:

    class Program
    {
        static void Main(string[] args)
        {
              Customer c = new customer();
        }
    }
class Customer{}
class User{}

CxList classes = All.FindByType(typeof(ClassDecl));
CxList types = All.FindByType(typeof(TypeRef));
CxList classesWithInstances = classes - classes.FindByShortName(types, true);

 the result would be -
      the same as FindByShortName(CxList nodesList)

CxList classes = All.FindByType(typeof(ClassDecl));
CxList types = All.FindByType(typeof(TypeRef));
CxList classesWithInstances = classes - classes.FindByShortName(types, false);

 the result would be -
      2 item found:
            Program ( in class Program)
              User ( in class User{})
```

Version Information

Supported from v1.8.1

5.84 CxList.FindByTypeModifiers Method (TypeSignednessModifiers, TypeSizeModifiers)

Returns a CxList which is a subset of this instance and its elements are of the specified type modifiers of code element.

Syntax

```
CxQL
public CxList FindByTypeModifiers(TypeSignednessModifiers TypeSignedness,
TypeSizeModifiers TypeSize)
```

Parameters

TypeSignedness

The type of the objects to be found. It can receive the following alternative values:

- TypeSignednessModifiers.Unknown
- TypeSignednessModifiers.Signed
- TypeSignednessModifiers.Unsigned

TypeSize

The type of the objects to be found. It can receive the following alternative values:

- TypeSignednessModifiers.Default
- TypeSignednessModifiers.Short
- TypeSignednessModifiers.Long
- TypeSignednessModifiers.LongLong

Return Value

A subset of this instance which elements type contains both modifiers provided.

Remarks

The return value may be empty (Count = 0).

Example

The following code example shows how you can use the FindByType method.

```
CxQL

 This example demonstrates the CxList.FindByTypeModifers() method.
 The input source code is:
 unsigned long int a;
 int b;
 b = a++;

result = All.FindByTypeModifiers (TypeSignednessModifiers.Unsigned,
TypeSizeModifiers.Long);
 the result would be -
      3 items found:
             int (in unsigned long int a)
             a (in unsigned long int a)
             a (in b = a++)
```

Version Information

Supported from v8.8.0

5.85 CxList.FindByTypeModifiers Method (TypeSignednessModifiers)

Returns a CxList which is a subset of this instance and its elements are of the specified type modifiers of code element.

Syntax

```
CxQL
public CxList FindByTypeModifiers(TypeSignednessModifiers TypeSignedness,
TypeSizeModifiers TypeSize)
```

Parameters

TypeSignedness

The type of the objects to be found. It can receive the following alternative values:

- TypeSignednessModifiers.Unknown
- TypeSignednessModifiers.Signed

- TypeSignednessModifiers.Unsigned

Return Value

A subset of this instance which elements type contains the modifier provided.

Remarks

The return value may be empty (Count = 0).

Example

The following code example shows how you can use the FindByType method.

```
CxQL

 This example demonstrates the CxList.FindByTypeModifers() method.
 The input source code is:
 unsigned long int a;
 int b;
 b = a++;

result = All.FindByTypeModifiers (TypeSignednessModifiers.Unsigned);
 the result would be -
      3 items found:
            int (in unsigned long int a)
            a (in unsigned long int a)
            a (in b = a++)
```

Version Information

Supported from v8.8.0

5.86 CxList.FindByTypeModifiers Method (TypeSizeModifiers)

Returns a CxList which is a subset of this instance and its elements are of the specified type modifiers of code element.

Syntax

```
CxQL
public CxList FindByTypeModifiers(TypeSignednessModifiers TypeSignedness,
TypeSizeModifiers TypeSize)
```

Parameters

TypeSize

The type of the objects to be found. It can receive the following alternative values:

- TypeSignednessModifiers.Default
- TypeSignednessModifiers.Short
- TypeSignednessModifiers.Long
- TypeSignednessModifiers.LongLong

Return Value

A subset of this instance which elements type contains the modifier provided.

Remarks

The return value may be empty (Count = 0).

Example

The following code example shows how you can use the FindByType method.

```
CxQL

 This example demonstrates the CxList.FindByTypeModifers() method.
 The input source code is:
 unsigned long int a;
 int b;
 b = a++;

result = All.FindByTypeModifiers (TypeSizeModifiers.Long);
 the result would be -
      3 items found:
            int (in unsigned long int a)
            a (in unsigned long int a)
            a (in b = a++)
```

Version Information

Supported from v8.8.0

5.87 CxList.FindByType Method (Type)

Returns a CxList which is a subset of this instance and its elements are of the specified type of code element.

Syntax

```
CxQL
public CxList FindByType(Type TypeName)
```

Parameters

TypeName

The type of the objects to be found

Return Value

A subset of this instance and its elements are of the specified type of code element.

Exceptions

Exception type	Condition
ArgumentNullException	**parameter is a null reference**

Remarks

The return value may be empty (Count = 0).

Example

The following code example shows how you can use the FindByType method.

```
CxQL

 This example demonstrates the CxList.FindByType() method.
 The input source code is:
 MyClass a;
 int b;
 a.DataMember = 3;
 b = a.Method();

result = All.FindByType (typeof(MemberAccess));
 the result would be -
      2 items found:
            a.DataMember (in a.DataMember = 3)
            a.Method (in b = a.Method())
```

Version Information

Supported from v1.8.1

5.88 CxList.FindByType Method (string)

Returns a CxList which is a subset of this instance and its elements are of the specified type.

Syntax

```
CxQL
public CxList FindByType(String Type)
```

Parameters

Type

The type of the objects to be found

Return Value

A subset of this instance and its elements are of the specified type.

Exceptions

Exception type	Condition
ArgumentNullException	**parameter is a null reference**

Remarks

The return value may be empty (Count = 0).

Example

The following code example shows how you can use the FindByType method.

```
CxQL

 This example demonstrates the CxList.FindByType() method.
 The input source code is:
 MyClass a;
 int b;
 a.DataMember = 3;
 b = a.Method();

result = All.FindByType ("MyClass");
 the result would be -
      3 items found:
            a (in MyClass a)
            a (in a.DataMember = 3)
            a (in b = a.Method())
```

Version Information

Supported from v1.8.1

5.89 CxList.FindByType Method (string, bool)

Returns a CxList which is a subset of this instance and its elements are of the specified type.

Syntax

```
CxQL
public CxList FindByType(String Type, bool CaseSensitive)
```

Parameters

Type

The type of the objects to be found

CaseSensitive

Ignore case true/false

Return Value

A subset of this instance and its elements are of the specified type.

Exceptions

Exception type	Condition
ArgumentNullException	**parameter is a null reference**

Remarks

The return value may be empty (Count = 0).

Example

The following code example shows how you can use the FindByType method.

```
CxQL

 This example demonstrates the CxList.FindByType() method.

 The input source code is:
 MyClass a;
 int b;
 a.DataMember = 3;
 b = a.Method();

result = All.FindByType ("MyClass",true);
 the result would be -
      3 items found:
             a (in MyClass a)
             a (in a.DataMember = 3)
             a (in b = a.Method())
```

Version Information

Supported from v1.8.1

5.90 CxList.FindByTypes Method (string[])

Returns a CxList which is a subset of this instance and its elements are of the specified type.

Syntax

```
CxQL
public CxList FindByType(String[] Types)
```

Parameters

Types

The types of the objects to be found

Return Value

A subset of this instance and its elements are of the specified types.

Exceptions

Exception type	Condition

ArgumentNullException	**parameter is a null reference**

Remarks

The return value may be empty (Count = 0).

Example

The following code example shows how you can use the FindByType method.

```
CxQL

 This example demonstrates the CxList.FindByType() method.
 The input source code is:
 MyClass a;
 int b;
 a.DataMember = 3;
 b = a.Method();

String[] arr = new String[]{"MyClass","int"};
result = All.FindByTypes(arr);
the result would be -
      6 items found:
             a (in MyClass a)
             a (in a.DataMember = 3)
             a (in b = a.Method())
             b (in int b)
              b (in b = a.Method())
             MyClass (in MyClass a)
```

Version Information

Supported from v1.8.1

5.91 CxList.FindByTypes Method (string[], bool)

Returns a CxList which is a subset of this instance and its elements are of the specified type.

Syntax

```
CxQL
public CxList FindByType(String[] Types, bool caseSensitive)
```

Parameters

Types

The types of the objects to be found

CaseSensitive

Ignore case true/false

Return Value

A subset of this instance and its elements are of the specified types.

Exceptions

Exception type	Condition
ArgumentNullException	**parameter is a null reference**

Remarks

The return value may be empty (Count = 0).

Example

The following code example shows how you can use the FindByType method.

```
CxQL

This example demonstrates the CxList.FindByType() method.
The input source code is:

MyClass a;
int b;
a.DataMember = 3;
b = a.Method();
String[] arr = new String[]{"MyClass","int"};
result = All.FindByTypes(arr,false);
the result would be -
      6 items found:
            a (in MyClass a)
            a (in a.DataMember = 3)
            a (in b = a.Method())
            b (in int b)
             b (in b = a.Method())
            MyClass (in MyClass a)
```

Version Information

Supported from v7.1.8

5.92 CxList.FindDefinition Method (CxList)

Returns a CxList which is a subset of "this" instance, with elements that are the definition locations of the first element in the given CxList.

Syntax

```
CxQL
public CxList FindDefinition(CxList items)
```

Parameters

Items

Items whose definition to be found.

Return Value

A subset of "this" instance, with elements that are the definition locations of the first element in the specified CxList.

Exceptions

Exception type	Condition
ArgumentNullException	**parameter is a null reference**

Comments

The return value may be empty (Count = 0).

Example

```
CxQL

This example demonstrates the CxList.FindDefinition() method.
The input source code is:
```

```
int b, a = 5;
if (a > 3)
     b = a;

result = All.FindDefinition(All.FindByName("*b*"));

The result would consist of 1 item:
            b (in int b, a = 5)
```

Version Information

Supported from v1.8.1

5.93 CxList.FindInitialization Method (CxList)

Returns a CxList which is a subset of "this" instance and the elements are the initialization values of the elements from the given CxList.

Syntax

```
CxQL
public CxList FindInitialization(CxList declarators)
```

Parameters

Declarators

A CxList of declarators.

Return Value

A subset of "this" instance whose elements are the initialization values of the given CxList elements.

Exceptions

Exception type	Condition
ArgumentNullException	**parameter is a null reference**

Comments

The return value may be empty (Count = 0).

Example

```
CxQL

This example demonstrates the CxList.FindInitialization() method.
The input source code is:

int b = 5;

CxList declarators = All.FindByType(typeof(Declarator));
result = All.FindInitialization(declarators);

The result would consist of 1 item:
            5
```

Version Information

Supported from v1.8.1

5.94 CxList.FindInScope Method (CxList, CxList)

Returns a CxList which is a subset of "this" instance with the elements inside the scopes defined by the start nodes CxList and the end nodes CxList.

Syntax

```
CxQL
public CxList FindInScope(CxList StartNodes, CxList EndNodes)
```

Parameters

StartNodes

the nodes that define the start of the scope.

EndNodes

the nodes that define the end of the scope.

Return Value

all nodes found inside the given scope.

Example

```
This example demonstrates the CxList.FindInScope(CxList StartNodes, CxList
EndNodes) method.
 The input source code is:
       @{ Html.BeginForm(); } //Defines the start of the scope
       @Html.AntiForgeryToken();
       @{ Html.EndForm(); } //Defines the end of the scope

CxList BeginFormMethods = All.FindByShortName("BeginForm");
CxList EndFormMethods = All.FindByShortName("EndForm");
result = All.FindInScope(BeginFormMethods, EndFormMethods);

the result would consist of 1 item:
            AntiForgeryToken(@Html.AntiForgeryToken();)
The purpose of the query is to find anything that is contained inside a specific
scope.
```

Version Information

Supported from 8.5.0

5.95 CxList.FindSubList Method (int, bool)

Returns a CxList which is a subset of "this". The following interface provides the ability to extract N elements from the CxList . **The main purpose of this interface is NOT use with member "data" of CxList.**

Syntax

```
CxQL
public CxList FindSubList(int count, bool fromStart)
```

Parameters

count

number of nodes to extract.

fromStart

If the parameter value is true it means get elements from start of the list

If the parameter value is false it means get elements from end of the list

.

Return Value

Requested count elements.

Example

```
Example 1: Get last element and add it to result
// Current Implementation
CSharpGraph secondParam = secondParameterOfSetHeader.data.GetByIndex(secondParam
eterOfSetHeader.Count-1) as CSharpGraph;
result.Add(secondParam.NodeId, secondParam);

// New Implementation
result.Add(secondParameterOfSetHeader.FindSubList (1,false));

Example 2: Get first and second element. Assume that all elementas are
BinaryExpr.

// Current Implementation
// currently not supporting logical conditions with more than two sons
if (curSons.Count >= 2)
{
     continue;
}

BinaryExpr firstOp = curSons.data.GetByIndex(0) as BinaryExpr;
BinaryExpr secondOp = curSons.data.GetByIndex(1) as BinaryExpr;


// New Implementation
// currently not supporting logical conditions with more than two sons
if (curSons.Count >= 2)
{
     continue;
}

// get first 2 elements of the list
CxList secondOpTemp  = curSons. FindSubList (2,true));
//get first one
BinaryExpr firstOp =
       secondOpTemp.FindSubList(1,true)).TryGetCSharpGraph<BinaryExpr>();

//get last one (second of original list)
BinaryExpr secondOp =
       secondOpTemp.FindSubList(1,false)).TryGetCSharpGraph<BinaryExpr>();
```

Version Information

Supported from 9.2.0

5.96 CxList.GetAncOfType Method (Type)

Returns a CxList with all the elements that are CxDOM first ancestor of the calling CxList and which are of type t. First ancestor means that it searches upward in the CxDOM graph until the first ancestor matching the condition (type t), and NOT that it searches only for fathers

Syntax

```
CxQL
public CxList GetAncOfType(Type t)
```

Parameters

The type of DOM objetct the methods looks for

Return Value

Returns a CxList with all the CxDOM elements of type t, which are first ancestor, of some element in the calling CxList.

Exceptions

Exception type	Condition
ArgumentNullException	**parameter is a null reference**

Remarks

The return value may be empty (Count = 0).
This command does not return a subset of the CxList, but a subset of All.

Example

The following code example shows how you can use the GetAncOfType method.

```
CxQL

 This example demonstrates the CxList.GetAncOfType() method.
 The input source code is:

 if (a>b)
 {
      c=100;
 }
 else
 {
      if(a<100)
      {
       d=200;
      }
 }

result = All.FindByName("d"). GetAncOfType(typeof(IfStmt));
 the result would be -
      1 item found:
      if (in  if(a<100))
```

Version Information

Supported from v2.0.5

5.97 CxList.GetArrayOfNodeIds Method ()

Returns a ArrayList which is a set of all elements IDs All this CxList.

Syntax

```
CxQL
public ArrayList GetArrayOfNodeIds()
```

Parameters

None

Return Value

ArrayList which is a set of all elements IDs All this CxList.

Exceptions

Exception type	Condition
ArgumentNullException	**parameter is a null reference**

Example

The following code example shows how you can use the FindByReturnType method.

```
CxQL

 This example demonstrates the CxList.GetArrayOfNodeIds() method.
 The input source code is:
public class a
{
void foo(){
 MyClass a;
 int b;
 a.DataMember = 3;
 b = a.Method();
 }
}
CxList ls = All;
foreach(int NodeId in ls.GetArrayOfNodeIds())
{
	if(NodeId !=1)
	{
		result = All.FindById(NodeId);
	}
}
```

Version Information

Supported from : v1.8.1

5.98 CxList.GetBlocksOfIfStatements Method (bool)

Returns a CxList with all the true/false blocks of the if statements inside the calling CxList according the the provided boolean parameter. The true block of an if statement is the block which is ran if the condition is verified, whereas the false block is the else block (if it exists).

Syntax

```
CxQL
public CxList GetBlocksOfIfStatements(Boolean block)
```

Parameters

A Boolean describing wether you want to retrieve the true or false blocks of the if statements inside the calling CxList.

Return Value

Returns a CxList containing all the true/false blocks of the if statements contained in the calling CxList.

Exceptions

Exception type	Condition
ArgumentNullException	**parameter is a null reference**

Remarks

The return value may be empty (Count = 0).
This command does not return a subset of the CxList, but a subset of All.

Example

The following code example shows how you can use the GetBlocksOfIfStatements method.

```
CxQL

 This example demonstrates the CxList.GetBlocksOfIfStatements(block) method.
 The input source code is:

 int a = 5;
 if (a > 3)
 {
       a = 4;
 }
 else if(a > 2)
 {
       a = 2;
 }
 else
 {
       a = 8;
 }

result = All.GetBlocksOfIfStatements(true);

 The result would consist of 2 items: the braces after if(a>3) (true block of
the if), and the braces after the else if (true block of the if).

 result = All.GetBlocksOfIfStatements(false);

 This query ran on the same sample code woud return the if(a>2) (false block of
the else in else if), and the braces after the else.
```

Version Information

Supported from v8.5.0

5.99 CxList.GetBlocksOfIterationStatements Method ()

Returns a CxList with the blocks of all the iterations contained in the calling CxList.

Syntax

```
CxQL
public CxList GetBranchesOfTernaryExpression(Boolean branch)
```

Parameters

None.

Return Value

Returns a CxList containing all the blocks of the iterations in the calling CxList.

Remarks

The return value may be empty (Count = 0).
This command does not return a subset of the CxList, but a subset of All.

Example

The following code example shows how you can use the GetBlocksOfIterationStatements method.

```
CxQL

 This example demonstrates the CxList.GetBlocksOfIterationStatements() method.
```

```
The input source code is:

while(condition)
{
      a = 1;
}
for(int i=0; i<10; i++)
{
      // code
}

result = All.GetBlocksOfIterationStatements();

The result would consist of 2 item: the 2 opening braces in the code.
```

Version Information

Supported from v8.5.0

5.100 CxList.GetBranchesOfTernaryExpressions Method (bool)

Returns a CxList with all the true/false branches of the ternary expressions inside the calling CxList according the the provided boolean parameter. The true branch of a ternary expression is the value given if the condition is true, whereas the false block is the value given if the condition is false.

Syntax

```
CxQL
public CxList GetBranchesOfTernaryExpression(Boolean branch)
```

Parameters

A boolean describing wether you want to retrieve the true or false branches of the ternary expressions inside the calling CxList.

Return Value

Returns a CxList containing all the true/false branches of the ternary expressions in the calling CxList.

Exceptions

Exception type	Condition
ArgumentNullException	**parameter is a null reference**

Remarks

The return value may be empty (Count = 0).
This command does not return a subset of the CxList, but a subset of All.

Example

The following code example shows how you can use the GetBranchesOfTernaryExpressions method.

```
CxQL

 This example demonstrates the CxList.GetBranchesOfTernaryExpressions(branch)
method.
 The input source code is:

 int a = someCondition ? 1:0;

result = All.GetBranchesOfTernaryExpressions(true);
```

```
 The result would consist of 1 item: the number 1.

result = All.GetBranchesOfTernaryExpressions(false);

 The result would consist of 1 item: the number 0.
```

Version Information

Supported from v8.5.0

5.101 CxList.GetByAncs Method (CxList)

Returns all elements in this instance that is a CxDOM descendant of an element of the parameter.

Syntax

```
CxQL
public CxList GetByAncs(CxList ancs)
```

Parameters

ancs

The Ancestors whose descendants are to be returned

Return Value

Returns all elements in this instance that descends any of the elements in the parameter

Example

The following code example shows how you can use the GetByAncs method.

```
CxQL

 This example demonstrates the CxList.GetByAncs() method.
 The input source code is:
 public notmuch (boolean tf)
{
      boolean localboolean = tf;
}

result = All.GetByAncs(All.FindByName("notmuch"));

 6 items found:
notmuch
boolean (in Boolean tf)
tf
boolean
localboolean
=
tf (in localoolean=tf)
```

Version Information

Supported from v2.0.5

5.102 CxList.GetByBinaryOperator Method (BinaryOperator)

Returns a CxList which is a subset of this instance and its elements are binary expressions with a given binary operator.

Syntax

```
CxQL
public CxList GetByBinaryOperator(BinaryOperator opr)
```

Parameters

opt

Enum type of binary operators.

Return Value

A subset of this instance with binary expressions which have a given binary operator.

Exceptions

Exception type	Condition
ArgumentNullException	**parameter is a null reference**

Remarks

The return value may be empty (Count = 0).

Example

The following code example shows how you can use the GetByBinaryOperator method.

```
CxQL

 This example demonstrates the CxList.GetByBinaryOperator() method.
 The input source code is:

 int i;
 if(i < 1)
       ...

result = All.GetByBinaryOperator(BinaryOperator.LessThan);

 the result would be -
      1 item found:
            <
```

Version Information

Supported from v1.8.1

5.103 CxList.GetByClass Method (CxList)

Returns all elements in “this” instance that belong to any of the classes in the parameter.

Syntax

```
CxQL
public int GetByClass(CxList classes)
```

Parameters

classes

The classes whose elements to be returned

Return Value

Returns all elements in this instance that belong to any of the classes in the parameter

Example

```
CxQL

 This example demonstrates the CxList.GetByClass() method.
 The input source code is:
 class cl1
 {
      void foo()
      {
            int a = 3;
            int b = 5;
      }
 }
 class cl2
 {
      void foo2()
      {
            int c = 3;
      }
 }

result = All.GetByClass(All.FindByName("*.cl1")).FindByName("3");

 The result would consist of 1 item found:
      3 (in int a = 3)
 Notice that 3 (in int c = 3) doesn't appear in the results, since it is not  in
the "cl1" class
```

5.104 CxList.GetByMethod Method (CxList)

Returns all elements in this instance that belong to any of the methods in the parameter

Syntax

```
CxQL
public int GetByMethod(CxList methods)
```

Parameters

methods

The methods whose elemets to be returned

Return Value

Returns all elements in this instance that belong to any of the methods in the parameter

Example

The following code example shows how you can use the GetByMethod method.

```
CxQL

 This example demonstrates the CxList.GetByMethod() method.
 The input source code is:
 class cl1
 {
```

```
      void foo()
      {
            int a = 3;
            int b = 5;
      }
      void foo2()
      {
            int c = 3;
      }
 }

result = All.GetByMethod(All.FindByName("foo2")).FindByName("3");

 1 item found:
      3 (in int c = 3)
 Notice that 3 (in int a = 3) doesn't appear in the results, since it is not  in
the "foo2" method
```

Version Information

Supported from v2.0.5

5.105 CxList.GetClass Method (CxList)

Returns the classes of this instance containing the objects in the parameter.

Syntax

```
CxQL
public CxList GetClass(CxList elements)
```

Parameters

elements

The elements whose classes to be returned

Return Value

Returns the classes of this instance containing the objects in the parameter.

Example

The following code example shows how you can use the GetClass method.

```
CxQL

 This example demonstrates the CxList.GetClass() method.
 The input source code is:
 class cl1
 {
      void foo()
      {
            int a = 3;
            int b = 5;
      }
 }

result = All.GetClass(All.FindByName ("5"));

 1 item found:
      cl1 (in class cl1)
```

Version Information

Supported from v2.0.5

5.106 CxList.GetCxListByPath Method ()

Create enumerator on CxList that enumerate on all existing paths.

Syntax

```
CxQL
public IEnumerable<CxList> GetCxListByPath()
```

Parameters

No parameters

Exceptions

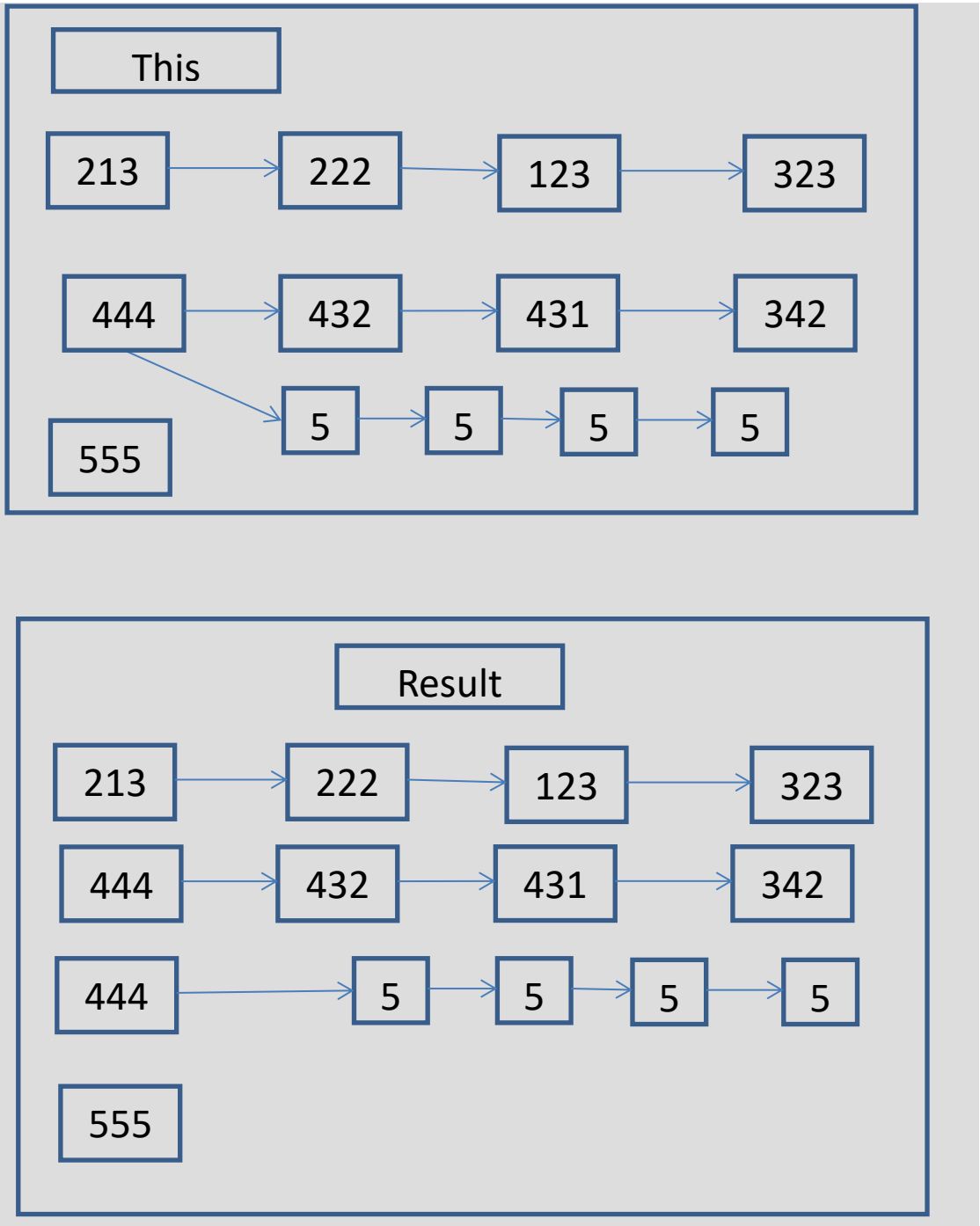
Exception type	Condition
ArgumentNullException	**parameter is a null reference**

Remarks

None

Example

```
CxQL

 This example demonstrates the IEnumerable<CxList> GetCxListByPath() method.

foreach (CxList thisCxList in this.GetCxListByPath())
{
   // thisCxList shall include one node and one path. If in “this” exists nodes without
   // pathes than thisCxList will have only one node.
}
```



Version Information

Supported from v7.1.3

5.107 CxList.GetEnumerator Method ()

Return IEnumerator of CxList.Data

Syntax

```
CxQL
public IEnumerator GetEnumerator()
```

Parameters

none

Return Value

Enumerator of CxList.Data.

Exceptions

Exception type	Condition
ArgumentNullException	**parameter is a null reference**

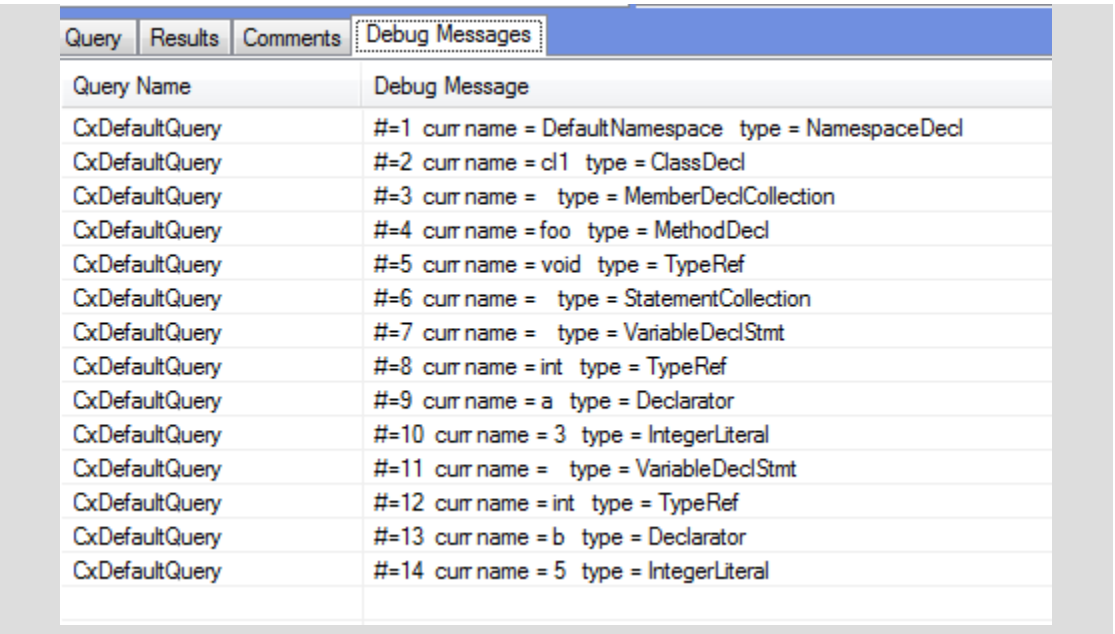
Remarks

Not in use (deprecated). A simpler implementation is by:

```
foreach  (CxList cxItem in resultList)
{
  :
}
```

Example

```
CxQL

 This example demonstrates the GetEnumerator, cxLog.WriteDebugMessage and
GetFirstGraph method.
 The input source code is:

class cl1
 {
      void foo()
      {
            int a = 3;
            int b = 5;
      }
 }

IEnumerator ieNum = All.GetEnumerator();
bool finish = false;
int i = 1;
while (!finish)
{
       if (!ieNum.MoveNext())
       {
              finish = true;
       }
       else
       {
              CxList curr = (CxList) ieNum.Current;
              if (curr.GetFirstGraph() != null)
              {
                     cxLog.WriteDebugMessage ("#=" + i.ToString() +
                     "  curr name = " + curr.GetName() + "   type = " +
                   curr.GetFirstGraph().GraphType.ToString());
                     i++;
              }
       }
}
   the result would be on DebugMessage tab in CxAudit program
```



Query | Results | Comments | Debug Messages

Query Name	Debug Message
CxDefaultQuery	#=1 curr name = DefaultNamespace type = NamespaceDecl
CxDefaultQuery	#=2 curr name = cl1 type = ClassDecl
CxDefaultQuery	#=3 curr name = type = MemberDeclCollection
CxDefaultQuery	#=4 curr name = foo type = MethodDecl
CxDefaultQuery	#=5 curr name = void type = TypeRef
CxDefaultQuery	#=6 curr name = type = StatementCollection
CxDefaultQuery	#=7 curr name = type = VariableDeclStmt
CxDefaultQuery	#=8 curr name = int type = TypeRef
CxDefaultQuery	#=9 curr name = a type = Declarator
CxDefaultQuery	#=10 curr name = 3 type = IntegerLiteral
CxDefaultQuery	#=11 curr name = type = VariableDeclStmt
CxDefaultQuery	#=12 curr name = int type = TypeRef
CxDefaultQuery	#=13 curr name = b type = Declarator
CxDefaultQuery	#=14 curr name = 5 type = IntegerLiteral

Version Information

Supported from v1.8.1

5.108 CxList.GetFathers Method ()

Returns a CxList which contains the direct fathers of the elements of "this" instance.

Syntax

```
CxQL
public CxList GetFathers ()
```

Return Value

A CxList which contains the direct fathers of the element of "this" instance.

Comments

The return value may be empty (Count = 0).

Example

```
CxQL

 This example demonstrates the CxList.GetFathers () method.
 The input source code is:

 int b, a = 5;
 if (a > 3)
      b = 6;

CxList six = All.FindByName("6");
result = six. GetFathers();

 the result would consist of 1 item found:
             =
```

5.109 CxList.GetFinallyClause Method (CxList)

Returns a CxList which is a subset of this instance and its elements are finally clauses of the specified CxList of try statements.

Syntax

```
CxQL
public CxList GetFinallyClause (CxList TryList)
```

Parameters

TryList

CxList of try statements.

Return Value

A subset of this instance with finally clauses.

Exceptions

Exception type	Condition
ArgumentNullException	**parameter is a null reference**

Remarks

The return value may be empty (Count = 0).

Example

The following code example shows how you can use the GetFinallyClause method.

```
CxQL
 This example demonstrates the CxList.GetFinallyClause() method.
 The input source code is:


int j;
 try
 {
       int i = 0;
       j = 1 / i;
 }
 finally
 {
       j = 1;
 }

CxList Try = All.FindByType(typeof(TryCatchFinallyStmt));
result = All.GetFinallyClause(Try);
 the result would be -
      1 item found:
            finally
```

Version Information

Supported from v1.8.1

5.110 CxList.GetFirstGraph Method ()

Returns a first data element in requested CxList. Using to get internal data of first object in requested CxList

Syntax

```
CxQL
public CSharpGraph GetFirstGraph()
```

Parameters

none

Return Value

A first element in Data. If CxList empty return null.

Exceptions

Exception type	Condition
ArgumentNullException	**parameter is a null reference**

Remarks

N/A

Example

```
CxQL

 This example demonstrates the CxList.GetFirstGraph() method.
 The input source code is:

class cl1
 {
      void foo()
      {
            int a = 3;
            int b = 5;
      }
 }
result = All.FindByShortName("foo");
if (result.Count > 0)
       cxLog.WriteDebugMessage(result.GetFirstGraph().ShortName);

 the result would be on DebugMessage tab in CxAudit program
       foo
```

Version Information

Supported from v1.8.1

5.111 CxList.GetFollowingStatements Method ()

Returns a CxList of the statements that are directly following all the statements of the calling CxList and in the same statement collection.

Syntax

```
CxQL
public CxList GetFollowingStatements()
```

Parameters

None.

Return Value

Returns a CxList containing all the statements that are following the statements in the calling CxList.

Remarks

The return value may be empty (Count = 0).
This command does not return a subset of the CxList, but a subset of All.

Example

The following code example shows how you can use the GetFollowingStatements method.

```
CxQL

 This example demonstrates the CxList.GetFollowingStatements() method.
 The input source code is:

 if (a > 3)
 {
       a = 4;
 }
 if(a != 4)
 {
       a = 0;
       b = 5;
 }
 c = 2;
 d = 3;

result = All.GetFollowingStatements();

 The result would consist of 2 items: the assignment b=5 (following a=0),
and d=3 (following c=2).
 The assignment a=4 doesn't have any following statement in its scope.
```

Version Information

Supported from v8.5.0

5.112 CxList.GetMembersOfTarget Method ()

Returns a CxList with all found members of the specified target.

Syntax

```
CxQL
public CxList GetMembersOfTarget()
```

Return Value

A CxList with members of a given target.

Exceptions

Exception type	Condition
ArgumentNullException	**parameter is a null reference**

Remarks

The return value may be empty (Count = 0).

Example

The following code example shows how you can use the GetMembersOfTarget method.

```
CxQL
```

```
This example demonstrates the CxList. GetMembersOfTarget() method.
The input source code is:

StreamWriter sw = new StreamWriter();
sw.Write("");

CxList sWriter = All.FindByType("StreamWriter");
result = sWriter. GetMembersOfTarget();

the result would be -
     1 item found:
           Write
```

Version Information

Supported from v1.8.1

5.113 CxList GetRightmostMember()

Returns a CxList with the rightmost members of the specified target.

Syntax

```
CxQL
public CxList GetRightmostMember()
```

Return Value

A CxList with the rightmost members of a given target.

Exceptions

Exception type	Condition

Remarks

The return value may be empty (Count = 0).

Example

The following code example shows how you can use the GetRightmostMember method.

```
CxQL

This example demonstrates the CxList. GetRightmostMember() method.
The input source code is:

int i = foo().Bar().a.b;

CxList foo = All.FindByName("foo");
result = foo. GetRightmostMember();

the result would be -
     1 item found:
           b
```

Version Information

Supported from v8.0

5.114 CxList GetLeftmostTarget()

Returns a CxList with leftmost target of the specified member.

Syntax

```
CxQL
public CxList GetLeftmostTarget()
```

Return Value

A CxList with the leftmost target of a given member.

Exceptions

Exception type	Condition

Remarks

The return value may be empty (Count = 0).

Example

The following code example shows how you can use the GetRightmostMember method.

```
CxQL

 This example demonstrates the CxList. GetLeftmostTarget() method.
 The input source code is:

int i = foo().Bar().a.b;

CxList b = All.FindByName("b");
result = b.LeftmostTarget();

 the result would be -
      1 item found:
            foo
```

Version Information

Supported from v8.0

5.115 CxList.GetMembersWithTargets Method ()

Returns a CxList which is a subset of “this” instance with nodes that are part of a member/target pair (typical example: target.member) and have a direct target (i.e. they are the member).

Syntax

```
CxQL
public CxList GetMembersWithTargets()
```

Return Value

Returns a CxList which is a subset of “this” instance with nodes that have a direct target.

Exceptions

Exception type	Condition

Remarks

The return value may be empty (Count = 0).

Example

The following code example shows how you can use the GetMembersWithTargets method.

```
CxQL

 This example demonstrates the CxList.GetMembersWithTargets() method.
 The input source code is:

 int num = 55;
 string Str = num.ToString().ToUpper().PadLeft(5, ' ');

CxList methods = All.FindByType(typeof(MethodInvokeExpr));
result = methods.GetMembersWithTargets();

 the result would be -
      3 items found:
            PadLeft, ToUpper, ToString in num.ToString().ToUpper().PadLeft(5, '
');
```

Version Information

Supported from v1.8.1

5.116 CxList.GetMembersWithTargets Method (CxList)

Returns a CxList which is a subset of “this” instance with nodes that are part of a member/target pair (typical example: target.member) and have a direct target in the CxList paramemeter "targets".

Syntax

```
CxQL
public CxList GetMembersWithTargets(CxList targets)
```

Parameters

targets - CxList of DOM objects which might be the target(s) of elements in "this"

Return Value

Returns a CxList which is a subset of “this” instance with nodes that have a direct target in "**targets**" parameter

Exceptions

Exception type	Condition

Remarks

The return value may be empty (Count = 0).

If targets is null – returns an empty CxList

Example

The following code example shows how you can use the GetMembersWithTargets method.

```
CxQL

 This example demonstrates the CxList.GetMembersWithTargets() method.
 The input source code is:
```

```
 int num = 55;
 string Str = num.ToString().ToUpper().PadLeft(5, ' ');

CxList methods = All.FindByType(typeof(MethodInvokeExpr));
CxList num = All.FindByShortName("num");
result = methods.GetMembersWithTargets(num);

 the result would be -
      1 item found:
            ToString in num.ToString().ToUpper().PadLeft(5, ' ');
```

Version Information

Supported from v1.8.1

5.117 CxList.GetMembersWithTargets Method (CxList, int)

Returns a CxList which is a subset of "this" instance with nodes that are part of a member/target pair (typical example: target.member) and have a direct target in "targets" parameter, or a target of target, a target of a target of a target …. Up to depthLimit depth

Syntax

```
CxQL
public CxList GetMembersWithTargets (CxList targets, int depthLimit)
```

Parameters

targets - CxList of DOM objects which might be the target(s) of elements in "this", or the target of a target of this…
depthLimit – the number of iterations to look for targets

Return Value

Returns a CxList which is a subset of "this" instance with nodes that have a direct target.

Exceptions

Exception type	Condition

Remarks

The return value may be empty (Count = 0).

If targets is null – returns an empty CxList

Example

The following code example shows how you can use the GetMembersWithTargets method.

```
CxQL

 This example demonstrates the CxList. GetMembersWithTargets() method.
 The input source code is:

 int num = 55;
 string Str = num.ToString().ToUpper().PadLeft(5, ' ');

CxList methods = All.FindByType(typeof(MethodInvokeExpr));
CxList num = All.FindByShortName("num");
result = methods.GetMembersWithTargets(num, 2);
```

```
the result would be -
     2 items found:
          ToString, ToUpper in num.ToString().ToUpper().PadLeft(5, ' ');
```

Version Information

Supported from v1.8.1

5.118 CxList.GetMethod Method (CxList)

Returns CxList which is a subset of this instance and its elements are methods of the specified CxList.

Syntax

```
CxQL
public CxList GetMethod(CxList list)
```

Parameters

List

CxList of any DOM objects.

Return Value

A subset of this instance which contains methods of the specified CxList.

Exceptions

Exception type	Condition
ArgumentNullException	**parameter is a null reference**

Remarks

The return value may be empty (Count = 0).

Example

The following code example shows how you can use the GetMethod method.

```
CxQL

 This example demonstrates the CxList. GetMethod() method.
 The input source code is:

 Class Cl
 {
       void foo()
       {
              int i = 1;
              i++;
       }
 }

CxList I_var = All.FindByShortName("i");
result = All. GetMethod(I_var);

 the result would be -
      1 item found:
            foo
```

Version Information

Supported from v1.8.1

5.119 CxList.GetName Method ()

Returns a first data element name in requested CxList. Using to get internal data of first object in requested CxList

Syntax

```
CxQL
public string GetName()
```

Parameters

none

Return Value

A name of the first element in Data. If CxList empty return null.

Exceptions

Exception type	Condition
ArgumentNullException	**parameter is a null reference**

Remarks

None

Example

```
CxQL

 This example demonstrates the CxList.GetName() method.
 The input source code is:

class cl1
 {
      void foo()
      {
            int a = 3;
            int b = 5;
      }
 }
result = All.FindByShortName("foo");
if (result.Count > 0)
       cxLog.WriteDebugMessage(result.GetName());

 the result would be on DebugMessage tab in CxAudit program
       foo
```

Version Information

Supported from v1.8.1

5.120 CxList.GetParameters Method (CxList)

Returns a CxList which is a subset of this instance and its elements are parameters of methods elements provided in CxList.

Syntax

```
CxQL
public CxList GetParameters (CxList MethodsList)
```

Parameters

MethodList

CxList of methods.

Return Value

Returns a CxList with all the parameters, from instance CxList, of the methods in MethodsLis.

Exceptions

Exception type	Condition
ArgumentNullException	**parameter is a null reference**

Remarks

The return value may be empty (Count = 0).

Example

```
CxQL

This example demonstrates the CxList.GetParameters(MethodsList) method.
The input source code is:

 foo(1, 3, i);

CxList methods = All.FindByType(typeof(MethodInvokeExpr));
result = All.GetParameters(methods);

 the result would consist of 3 items:
             1,
             3,
             i
```

Version Information

Supported from v1.8.1

5.121 CxList.GetParameters Method (CxList, int)

Returns a CxList which is a subset of instance CxList and its elements are parameters of methods elements provided in CxList.

Syntax

```
CxQL
public CxList GetParameters (CxList MethodsList, int paramNo)
```

Parameters

MethodList

CxList of methods.

paramNo

The number of parameter to return (begins with 0)

Return Value

Returns a CxList with paramNo parameters, from instance CxList, of the methods in MethodsList.

Exceptions

Exception type	Condition
ArgumentNullException	**parameter is a null reference**

Remarks

The return value may be empty (Count = 0).

Example

```
CxQL

This example demonstrates the CxList.GetParameters(MethodsList,paramNo) method.
The input source code is:

 foo(1, 3, i);

CxList methods = All.FindByType(typeof(MethodInvokeExpr));
result = All.GetParameters(methods, 1);

 the result would consist of 1 items:
            3
```

Version Information

Supported from v1.8.1

5.122 CxList.GetPathsOrigins Method ()

Returns a CxList which is a subset of instance CxList and contains end nodes of paths.

Syntax

```
CxQL
public CxList GetPathsOrigins ()
```

Return Value

Returns CxList that contains end nodes of paths

Exceptions

Exception type	Condition
ArgumentNullException	**parameter is a null reference**

Remarks

The return value may be empty (Count = 0).

Example

```
CxQL

 This example demonstrates the CxList.GetPathsOrigins() method.
 The input source code is:

 public void setString (String str){
       if (str.length >0){
              lst.add(str);
       }
 }
CxList paths = All.DataInfluencingOn(All.FindByShortName("add"));
result = paths.GetPathsOrigins();

the result would consist of 3 items:
            lst      (in lst.add(str);)
              str    (in lst.add(str);)
```

```
            str    (in (String str);)
```

5.123 CxList.GetStartAndEndNodes Method (GetStartEndNodesType)

Returns CxList which is a subset of instance CxList and contains start nodes or end nodes or both start and nodes of path or all nodes in path.

Syntax

```
CxQL
public CxList GetStartAndEndNodes (GetStartEndNodesType type)
```

Parameters

Type

The type of nodes to be returned:

CxList.GetStartEndNodesType.StartNodesOnly

CxList.GetStartEndNodesType.EndNodesOnly

CxList.GetStartEndNodesType.StartAndEndNodes

CxList.GetStartEndNodesType.AllNodes

Return Value

Returns CxList which is a start nodes or end nodes or both start and nodes of path or all nodes in path.

Exceptions

Exception type	Condition
ArgumentNullException	**parameter is a null reference**

Remarks

The return value may be empty (Count = 0).

Example

```
CxQL

 This example demonstrates the CxList.GetStartsAndEndNodes (type) method.
 The input source code is:

public void setString (String str){
       lst.add(str);
}

CxList paths = All.DataInfluencingOn(All.FindByShortName("add"));

1. result =
paths.GetStartAndEndNodes(CxList.GetStartEndNodesType.StartNodesOnly);
the result would consist of 2 items:
            lst      (in lst.add(str);)
            str      (in (String str);)
2. result =
paths.GetStartsAndEndNodes(CxList.GetStartEndNodesType.EndNodesOnly);
the result would consist of 1 items:
              add    (in lst.add(str);)
```

```
3. result=
paths.GetStartAndEndNodes(CxList.GetStartEndNodesType.StartAndEndNodes);
the result would consist of 3 items:
            lst      (in lst.add(str);)
            str      (in (String str);)
              add    (in lst.add(str);)
4. result = paths.GetStartAndEndNodes(CxList.GetStartEndNodesType.AllNodes);
the result would consist of 4 items:
            lst      (in lst.add(str);)
            str      (in (String str);)
              add    (in lst.add(str);)
              str    (in lst.add(str);)
5. result =
paths.GetStartAndEndNodes(CxList.GetStartEndNodesType.AllButNotStartAndEnd);
the result would consist of 2 items:
            lst      (in lst.add(str);)
              str    (in lst.add(str);)
```

Version Information

Supported from v7.1.2

5.124 CxList.GetTargetOfMembers Method ()

Returns the list of elements which are the targets from the members of "this" instance.

Syntax

```
CxQL
public CxList GetTargetOfMembers()
```

Parameters

none

Return Value

A list of objects from which "this" instance elements are member of.

Example

```
CxQL

 This example demonstrates the CxList.GetTargetOfMembers() method.
 The input source code is:
 class cl1
 {
      void foo()
      {
             int a = obj.func();
      }
 }

result = All.FindByName("*.func").GetTargetOfMembers();

 The result would consist of 1 item:
      obj (in int a = obj.func())
```

5.125 CxList.GetTargetsWithMembers Method ()

Returns a CxList which is a subset of “this” instance with nodes that are part of a member/target pair (typical example: target.member) and have a direct member (i.e. they are the target).

Syntax

```
CxQL
public CxList GetTargetsWithMembers()
```

Return Value

Returns a CxList which is a subset of “this” instance with nodes that have a direct member.

Exceptions

Exception type	Condition

Remarks

The return value may be empty (Count = 0).

Example

The following code example shows how you can use the GetTargetsWithMembers method.

```
CxQL

 This example demonstrates the CxList.GetTargetsWithMembers() method.
 The input source code is:

 int num = 55;
 string Str = num.ToString().ToUpper().PadLeft(5, ' ');

CxList methods = All.FindByType(typeof(MethodInvokeExpr));
result = methods.GetTargetsWithMembers();

 the result would be -
      2 items found:
            ToUpper, ToString in num.ToString().ToUpper().PadLeft(5, ' ');
```

Version Information

Supported from v1.8.1

5.126 CxList.GetTargetsWithMembers Method (CxList)

Returns a CxList which is a subset of “this” instance with nodes that are part of a member/target pair (typical example: target.member) and have a direct member in the CxList paramemeter "members".

Syntax

```
CxQL
public CxList GetTargetsWithMembers(CxList members)
```

Parameters

members - CxList of DOM objects which might be the member(s) of elements in "this"

Return Value

Returns a CxList which is a subset of “this” instance with nodes that have a direct member in members parameter.

Exceptions

Exception type	Condition

Remarks

The return value may be empty (Count = 0).

If members is null – returns an empty CxList

Example

The following code example shows how you can use the GetTargetsWithMembers method.

```
CxQL

 This example demonstrates the CxList.GetTargetsWithMembers() method.
 The input source code is:

 int num = 55;
 string Str = num.ToString().ToUpper().PadLeft(5, ' ');

CxList methods = All.FindByType(typeof(MethodInvokeExpr));
CxList member = All.FindByShortName("PadLeft");
result = methods.GetTargetsWithMembers(member);

 the result would be -
      1 item found:
            ToUpper in num.ToString().ToUpper().PadLeft(5, ' ');
```

Version Information

Supported from v1.8.1

5.127 CxList.GetTargetsWithMembers Method (CxList, int)

Returns a CxList which is a subset of “this” instance with nodes that are part of a member/target pair (typical example: target.member), and have a direct member in CxList paramemeter "members", or a member of a member… up to depth depthLimit

Syntax

```
CxQL
public CxList GetTargetsWithMembers(CxList targets, int depthLimit)
```

Parameters

members - CxList of DOM objects which might be the member(s) of elements in "this", or the memebr of member of this, …

depthLimit – the number of iterations to look for members

Return Value

Returns a CxList which is a subset of “this” instance with nodes that have a direct /chain memebr.

Exceptions

Exception type	Condition

Remarks

The return value may be empty (Count = 0).

If members is null – returns an empty CxList

Example

The following code example shows how you can use the GetTargetsWithMembers method.

```
CxQL

 This example demonstrates the CxList.GetTargetsWithMembers() method.
 The input source code is:

string Str = "sample".ToString().ToUpper().PadLeft(5, ' ');

CxList methods = All.FindByType(typeof(MethodInvokeExpr));
CxList member = All.FindByShortName("PadLeft");
result = methods.GetTargetsWithMembers(member, 2);

 the result would be -
      2 items found:
           ToString, ToUpper in num.ToString().ToUpper().PadLeft(5, ' ');
```

Version Information

Supported from v1.8.1

5.128 CxList.InheritsFrom Method (string)

Returns a CxList which is a subset of "this" instance and its elements are inherited from the given class name.

Syntax

```
CxQL
public CxList InheritsFrom(string baseClassName)
```

Parameters

baseClassName

The name of the base class.

Return Value

A subset of "this" instance which elements are inherited from the given base class name.

Exceptions

Exception type	Condition
ArgumentNullException	**parameter is a null reference**

Comments

The return value may be empty (Count = 0).

Example

```
CxQL

 This example demonstrates the CxList.InheritsFrom() method.
 The input source code is:

 class BClass
 {
```

```
}

class CClass : BClass
{

}

result = All.InheritsFrom("BClass");

The result would consist of 1 item:
           CClass
```

Version Information

Supported from v1.8.1

5.129 CxList.InheritsFrom Method (CxList)

Returns a CxList which is a subset of "this" instance and its elements are inherited from the given CxList of classes.

Syntax

```
CxQL
public CxList InheritsFrom(CxList baseClassList)
```

Parameters

baseClassList

The CxList of base classes.

Return Value

A subset of "this" instance which elements are inherited from the given base classes.

Exceptions

Exception type	Condition
ArgumentNullException	**parameter is a null reference**

Comments

The return value may be empty (Count = 0).

Example

```
CxQL

This example demonstrates the CxList.InheritsFrom() method.
The input source code is:

class BClass
{

}

class CClass : BClass
{

}
```

```
CxList cl = All.FindByName("BClass");
result = All.InheritsFrom(cl);

 The result would consist of 1 item:
           CClass
```

Version Information

Supported from v1.8.1

5.130 CxList.IntersectWithNodes Method (CxList)

Returns a CxList which is a subset of paths, which are the instance CxList, that includes elements of intersected CxList.

Syntax

```
CxQL
public CxList IntersectWithNodes (CxList intersect)
```

Parameters

intersect

intersected CxList elements

Return Value

Returns a CxList which is a subset of the 'this' instance , that includes at least one element of intersected CxList.

Exceptions

Exception type	Condition
ArgumentNullException	**parameter is a null reference**

Remarks

The return value may be empty (Count = 0).

Example

```
CxQL

 This example demonstrates the CxList.IntersectWithNodes() method.
 The input source code is:

 public void setString (String str){
       if (str.length >0){
              lst.add(str);
       }
       else{
              String otherStr ="string is empty";
              lst.add(otherStr);
       }
}

CxList intersect = All.FindByShortName("otherStr");
CxList paths = All.DataInfluencingOn(All.FindByShortName("add"));
result = paths.IntersectWithNodes(intersect);
the result would consist of 3 items:
       all ending at add    (in lst.add(otherStr);)
       starting
```

```
            otherStr        (in lst.add(otherStr);)
              otherStr              (in String otherStr ="string is empty";)
              "string is empty"     (in String otherStr ="string is empty";)
```

Version Information

Supported from 7.1.2

5.131 CxList.IntersectWithNodes Method (CxList, CxList.IntersectionType)

Returns a CxList which is a subset of paths, which are the instance CxList, that includes elements of intersected CxList.

Syntax

```
CxQL
public CxList IntersectWithNodes (CxList intersect, IntersectionType type)
```

Parameters

intersect

intersected CxList elements

type

The type of intersection to be made:

CxList.IntersectionType.AllNodes

CxList.IntersectionType.AnyNodes (default)

Return Value

Returns a CxList which is a subset of the 'this' instance , that includes at least one element of intersected CxList when the type is 'AnyNodes', and includes all elements of intersected CxList when the type is 'Allnodes'.

Exceptions

Exception type	Condition
ArgumentNullException	**parameter is a null reference**

Remarks

The return value may be empty (Count = 0).

Example

```
CxQL

This example demonstrates the CxList.IntersectWithNodes() method.
The input source code is:

public void setString (String str){
      if (str.length >0){
            lst.add(str);
      }
      else{
            String otherStr ="string is empty";
            lst.add(otherStr);
      }
```

```
}

CxList intersect = All.FindByShortName("otherStr");
intersect.Add(All.FindByType(typeof(StringLiteral)));
CxList paths = All.DataInfluencingOn(All.FindByShortName("lst"));
result = paths.IntersectWithNodes(intersect, CxList.IntersectionType.AllNodes);
the result would consist of 1 item:
       a flow starting on “string is empty”, passing on the 2 occurrences of
‘otherStr’ and the ‘add’ method, and ending on the ‘lst’ UnknownReference.
```

Version Information

Supported from 9.1.0

5.132 CxList.ReduceFlow Method (CxList.ReduceFlowType)

Returns CxList which is a subset of instance CxList and consists of longest paths to/from destination element for CxList.ReduceFlowType.ReduceSmallFlow parameter or shortest paths to/from destination element for CxList.ReduceFlowType.ReduceBigFlow parameter.

Syntax

```
CxQL
public CxList ReduceFlow (CxList.ReduceFlowType flowType)
```

Parameters

Type

The type of flow for reduce:

CxList.ReduceFlowType.ReduceBigFlow

CxList.ReduceFlowType.ReduceSmallFlow

Return Value

Returns CxList which is a subset of paths that consists of longest paths or shortest paths to/from destination element, depending on ReduceFlow methods parameter.

Exceptions

Exception type	Condition
ArgumentNullException	**parameter is a null reference**

Remarks

The return value may be empty (Count = 0).

Example

```
CxQL

 This example demonstrates the CxList. ReduceFlow () method.

 The input source code is:

ArrayList<String> lst = new ArrayList<String>();
public void setString (String str){
       if (str.length >0){
              lst.add(str);
       }
```

```
	else{
		String otherStr ="string is empty";
		lst.add(otherStr);
	}
}

CxList paths = All.DataInfluencingOn(All.FindByShortName("add"));

1.result =  paths.ReduceFlow(CxList.ReduceFlowType.ReduceBigFlow);
the result would consist of 4 items:
	all ending at add	(in lst.add(otherStr);)
	starting
		lst			(in lst.add(str))
		str			(in lst.add(str))
		lst			(in lst.add(otherStr);)
	    otherStr		(in lst.add(otherStr);)

2. result = paths.ReduceFlow(CxList.ReduceFlowType.ReduceSmallFlow);

the result would consist of 4 items:
	all ending at add	(in lst.add(otherStr);)
starting	lst	(in ArrayList<String> lst = new ArrayList<String>();)
ending add		(in lst.add(str);)

starting	lst		(in lst.add(str))
ending add		(in lst.add(otherStr);)

starting	str		(in (String str))
ending add		(in lst.add(str);)

starting	"string is empty"		(in String otherStr ="string is
empty";)
ending add			(in lst.add(otherStr);)
```

Version Information

Supported from 7.1.2

5.133 CxList.ReduceFlowByPragma Method ()

Returns a CxList which is a subset of instance CxList and consists of shortest paths from path starting line to path end line.

Syntax

CxQL

```
public CxList ReduceFlowByPragma ()
```

Parameters

Return Value

Returns a CxList which are shortest paths from path starting line to path end line.

Exceptions

Exception type	Condition
ArgumentNullException	**parameter is a null reference**

Remarks

The return value may be empty (Count = 0).

Example

```
CxQL

 This example demonstrates the CxList. ReduceFlowByPragma () method.
 The input source code is:

 public void setString (){
       String otherStr = otherStr;
       lst.add(otherStr);
}

CxList paths = All.DataInfluencedBy(All.FindByShortName("otherStr"));
result = paths.ReduceFlowByPragma();

the result would consist of 4 items:
  starts in otherStr of (String otherStr) ends in otherStr of
(lst.add(otherStr);)
  starts in otherStr of (= otherStr;)     ends in otherStr of (String otherStr)
  starts in otherStr of (String otherStr) ends in add of (lst.add(otherStr);)
  starts in otherStr of (lst.add(otherStr);) ends in add of (lst.add(otherStr);)
```

Version Information

Supported from 7.1.2

5.134 CxList.SanitizeCxList Method (CxList sanitizeNodes)

Returns a CxList which is a subset of paths, which are the instance CxList, that doesn't include sanitize nodes.

Syntax

```
CxQL
public CxList SanitizeCxList (CxList sanitizeNodes)
```

Parameters

SanitizeNodes

CxList of sanitizer nodes.

Return Value

Returns a CxList which is a subset of paths that doesn't include sanitize nodes.

Exceptions

Exception type	Condition
ArgumentNullException	**parameter is a null reference**

Remarks

The return value may be empty (Count = 0).

Example

```
CxQL

 This example demonstrates the CxList. SanitizeCxList () method.
```

```
 The input source code is:

public void setString (String input){
       String otherStr = input;
       lst.add(otherStr);
}
CxList paths = All.DataInfluencingOn(All.FindByShortName("add"));
CxList sanitizeNodes = All.FindByShortName("input");
result = paths.SanitizeCxList(sanitizeNodes);

the result would consist of 3 items:
       all ends with add in lst.add(otherStr);
       starts:
       otherStr      (in String otherStr = input;)
       lst           (in lst.add(otherStr);)
       otherStr      (in lst.add(otherStr);)
```

Version Information

Supported from 7.1.2

5.135 CxList.FillGraphsList Method (CxList)

Fills graphs for the list of roots given.

Syntax

```
CxQL
public void FillGraphsList (CxList graphRoots)
```

Parameters

graphRoots

List of roots to be filled with the graphs.

Return Value

None.

Exceptions

Exception type	Condition
NullReferenceException	**parameter is a null reference**

Example

```
CxQL

 This example demonstrates the CxList. FillGraphsList () method.
 With any Input source code, the method can be called after a Query.
result=All;
FillGraphsList(result);
 At this point, the result list is filled with the Graphs.
```

Version Information

Supported from 7.1.2

5.136 CxList.FillGraphsList Method (CSharpGraph)

Fill graphs from one root element.

Syntax

```
CxQL
public void FillGraphsList (CSharpGraph graphRoot)
```

Parameters

graphRoot

CSharpGraph instance to be filled with Graphs.

Return Value

None.

Exceptions

Exception type	Condition
ArgumentNullException	**parameter is a null reference**

Example

```
CxQL

 This example demonstrates the CxList. FillGraphsList () method.
 With any Input source code, the method can be called after a Query.
first=All.GetFirstGraph();
FillGraphsList(first);
 At this point, the first is filled with the Graphs.
```

5.137 CxList.GetIndexOfParameter Method ()

For a single Param or ParamDecl returns the index of the parameter 0 based.

Syntax

```
CxQL
public int GetIndexOfParameter ()
```

Parameters

Return Value

Integer containing the index of the parameter zero based, or -1 if not a parameter or list empty or contains multiple nodes. Note that the CxList must contain exactly one node, and the node must be of type Param or ParamDecl.

Exceptions

Exception type	Condition

Example

```
CxQL

 This example demonstrates the CxList.GetIndexOfParameterMethod() method.
 It prints out to the log the index of each of the parameters.

result = All.FindByType(typeof(Param));
foreach (CxList list in result)
{
       cxLog.WriteDebugMessage("Parameter index = " + list.
GetIndexOfParameter());
}
```

5.138 CxList.FindSQLInjections Method (CxList, CxList, CxList)

Returns flow for SQL Injection from input to db that is not sanitized

Syntax

```
CxQL
public CxList FindSQLInjections (CxList inputs, CxList db, CxList sanitize)
```

Parameters

inputs

CxList containing input elements

db

CxList containing output elements (eg. database)

sanitize

CxList containing sanitizing elements (cast to integer etc).

Return Value

CxList containing flow of SQL injection from input to output which is not flowing through a sanitizer

Exceptions

Exception type	Condition

Remarks

Actually uses inputs.InfluencingOnAndNotSanitized(db, sanitize).

Example

```
CxQL

// Find the inputs for the SQL injection
CxList inputs = All.FindByShortName("ReadLine");
//Find the entrance to the Database command
CxList dbIn = All.GetParameters(All.FindByShortName("SqlCommand"));
//Find a potential sanitizer
CxList integerSanitizers = Find_Integers();
//Find sql injections using previous results
result = All.FindSQLInjections(inputs, dbIn, integerSanitizers);
```

5.139 CxList.FindXSS Method (CxList, CxList, CxList)

Returns flow for XSS from input to output that is not sanitized

Syntax

```
CxQL
public CxList FindXSS (CxList inputs, CxList outputs, CxList sanitize)
```

Parameters

inputs

CxList containing input elements

outputs

CxList containing output elements for xss.

sanitize

CxList containing sanitizing elements (cast to integer etc).

Return Value

CxList containing flow of XSS from input to output which is not flowing through a sanitizer

Exceptions

Exception type	Condition

Remarks

Actually uses inputs.InfluencingOnAndNotSanitized(db, sanitize).

Example

```
CxQL

CxList inputs = All.FindByShortName("request");
CxList outputs = All.FindByShortName("output");
CxList sanitize = All.FindByShortName("escape");
result = All.FindXSS(inputs, outputs, sanitize);
```

5.140 CxList.Clone Method ()

Clones the current (this) CxList

Syntax

```
CxQL
public CxList Clone ()
```

Parameters

Return Value

CxList containing a clone of the current (this) CxList

Exceptions

Exception type	Condition

Example

```
CxQL

CxList A = All.FindByType(typeof(UnknownReference));
CxList B = A; //B points to same elements as A
CxList B = A.Clone(); //B has a copy (clone) of the elements in A
```

5.141 CxList.TryGetCSharpGraph<T> Method () where T : CSharpGraph

Try to extract the DOM object from the first node in 'this' CxList and cast it to type 'T'. Returns null if the CxList is empty, or if the casting fails.

Syntax

```
CxQL
public CxList TryGetCSharpGraph <T>()
```

Parameters

<T> the type to cast the DOM object to (must inherit from CSharpGraph)

Return Value

The DOM object after casting

Exceptions

Exception type	Condition

Example

```
CxQL

CxList A = All.FindById(10);
CSharpGraph cs = A.TryGetCSharpGraph<CSharpGraph>();
// If A contains at least 1 node, cs will contain its DOM object
```

Version Information

Supported from 8.4.0

5.142 CxList.GetQueryParam Method (string paramName)

Try to get a value for a query parameter using the key paramName. Returns an empty string if the key was not found and on errors.

Syntax

```
CxQL
public string GetQueryParam(string paramName)
```

Parameters

paramName

The parameter name (key)

Return Value

The value of the received key, or an empty string if the key was not found.

Exceptions

Exception type	Condition

Example

```
CxQL

string val = All.GetQueryParam("Param");
// If the key "Param" was found in the configuration, than val now holds its
value, otherwise, val is an empty string
if (string.IsNullOrEmpty(val))
{
	// Use val
```

```
}
```

Version Information

Supported from 8.4.0

5.143 CxList.GetQueryParam<T> Method (string paramName, T defaultVal = default(T))

Try to get a value for a query parameter using the key paramName and parse the returnd string value to type T. Returns defaultVal if the key was not found and on errors.

Syntax

```
CxQL
public string GetQueryParam<T>(string paramName, T defaultVal = default(T))
```

Parameters

<T>

The type of defaultVal and the returned value

paramName

The parameter name (key)

defaultVal

The value to return on errors

Return Value

The value for the received key parset to type T, or defaultVal if the key was not found or if the value returned cannot be parsed to type T..

Exceptions

Exception type	Condition

Example

```
CxQL

int val = All.GetQueryParam<int>("Param", 0);
// If the key "Param" was found in the configuration, than val now holds its
value, otherwise, val is 0
if (val > 0)
{
	// Use val
}
```

Version Information

Supported from 8.4.0

5.144 CxList.FindByFiles Method (CxList source)

Return a subset of 'this' instance, where its DOM objects are on the same file(s) as the DOM objects in the 'source' CxList.

Syntax

```
CxQL
```

```
public CxList FindByFiles(CxList source)
```

Parameters

source

A Cxlist that have DOM objects in the required files.

Return Value

Rerurns Return a subset of 'this' instance, where its DOM objects are on the same file(s) as the DOM objects in the 'source' CxList..

Exceptions

Exception type	Condition

Example

```
CxQL

CxList a = All.FindByFileName("*method.js*");
CxList b = All.FindByFileName("*method.json");
Result = a.FindByFiles(b);
// Return a subset of 'a' where the objects are of the same file as the objects
of b.
```

Version Information

Supported from 8.4.0

5.145 CxList.FindRegexMatches Method (CxList comments)

Return a subset of 'this' instance which objects are of type Comment, and are equivalent to objects of type Comment in the comments CxList.

Syntax

```
CxQL
public CxList FindRegexMatches(CxList comments)
```

Parameters

A CxList of Comment type objects to find matches against the Comment objects in 'this'

Return Value

Return a subset of 'this' instance which objects are of type Comment, and are equivalent to objects of type Comment in the comments CxList..

Exceptions

Exception type	Condition

Example

```
CxQL

// Each time a FindByRegexExt or FindByRegex generate Comment type objects, they
are get a different NodeId, even if the represent the same string in the project
code.

CxList a = All.FindByRegexExt("http://");
```

```
a.Add(All.FindByRegexExt("https://"));
CxList b = All.FindByRegexExt("http://"); // The strings that starts with
http:// in 'a', now exist in 'b' but with a different NodeId number.
Result = a. FindRegexMatches(b);
// Return a subset of 'b' where the objects returned are equivalent to other
objects in 'a'.
```

Version Information

Supported from 8.4.0

5.146 CxList.GetAssigner Method (CxList others = null)

For each DOM object in 'this' which is on the left side of an assignment, return the right side of the assignment, which are in the others CxList.

Syntax

```
CxQL
public CxList GetAssigner(CxList others = null)
```

Parameters

others

CxList containing the right side of the assignment. If null – treat it as if it was All.

Return Value

For each DOM object in 'this' which is on the left side of an assignment, return the right side of the assignment, which are in the others CxList

Exceptions

Exception type	Condition

Example

```
CxQL

The input source code is:
 int a = 0;
 int b = a;
 b = 2;
 int c = b > 1 ? 3 : a;
CxList a = All.FindByShortName("a");
CxList b = All.FindByShortName("b");
CxList c = All.FindByShortName("c");

result = b.GetAssigner();
// result now holds 'a' in int b = a; and 2 in b = 2;
result = c.GetAssigner();
// result now holds 3 and 'a' in int c = b > 1 ? 3 : a;
result = c.GetAssigner(a);
// result now holds 'a' in int c = b > 1 ? 3 : a;
```

Version Information

Supported from 8.4.0

5.147 CxList.GetAssignee Method (CxList others = null)

For each DOM object in 'this' which is on the right side of an assignment, return the left side of the assignment, which are in the others CxList.

Syntax

```
CxQL
public CxList GetAssignee(CxList others = null)
```

Parameters

others

CxList containing the left side of the assignment. If null – treat it as if it was All.

Return Value

For each DOM object in 'this' which is on the right side of an assignment, return the left side of the assignment, which are in the others CxList

Exceptions

Exception type	Condition

Example

```
CxQL

The input source code is:
 int a = 0;
 int b = a;
 b = 2;
 int c = b > 1 ? 3 : a;
CxList a = All.FindByShortName("a");
CxList b = All.FindByShortName("b");
CxList c = All.FindByShortName("c");

result = a.GetAssignee();
// result now holds 'b' in int b = a; and c in int c = b > 1 ? 3 : a;
result = a.GetAssignee(b);
// result now holds 'b' in int b = a;
```

Version Information

Supported from 8.4.0

5.148 CxList Abstract Interpretation Methods

An abstract value is an instance of a class that implements the "IAbstractValue" interface.

The interface "IAbstractValue" is implemented by the following classes:

- AnyAbstractValue
- IntegerIntervalAbstractValue
- StringAbstractValue
- TrueAbstractValue
- FalseAbstractValue
- NullAbstractValue

- ObjectAbstractValue
- FunctionAbstractValue
- NoneAbstractValue

The ObjectAbstractValue class has two parameters which can be used to query a certain object:

- **ParentPointerMayBeNull**: indicated that the pointer's / instance's possible values contain the null value)
- **AllocationState**: current allocation state in the heap, value may be one the following:
  - ObjectAllocationState.Allocated (object is allocated and exists in the heap)
  - ObjectAllocationState.Released (object has been freed / released from the heap)
  - ObjectAllocationState.Ambiguous (object either exists or has been released from the heap)

bool IAbstractValue.IncludedIn(IAbstractValue absValue, bool strictTypeMatch = false)

Parameters

abstractValue

An abstract value

strictTypeMatch

Return Value

If "this" includes the abstract value parameter "absValue" → "IncludedIn" method returns true, otherwise method returns false.

Examples:

Here is a list of IAbstractvalue

```
List<IAbstractValue> list = {new AnyAbstractValue(),
                             new IntegerIntervalAbstractValue(1, 2),
                             new StringAbstractValue("body")};
```

1.
```
int count = 0;
IAbstractvalue source = new IntegerAbstractvalue(1);
foreach (var val in list)
        if (source.IncludedIn(val))  count++;
```
The value of variable count will be 2. // any and integer return "true"

2.
```
int count = 0;
IAbstractvalue source = new IntegerAbstractvalue(1);
foreach (var val in list)
        if (source.IncludedIn(val,true)) count++;
```
The value of variable count will be 1. // only integer return "true"

3.
```
int count = 0;
IAbstractvalue source = new IntegerAbstractvalue(1);
foreach (var val in list)
        if (val.IncludedIn(source))  count++;
```
The value of variable count will be 0. // [1,2] not included in [1,1]. Here is the question (IncludeIn) activate with opposite order.

5.148.1 CxList.FindByAbstractValue Method (Func<IAbstractValue, bool> criterion)

Returns a CxList which is a subset of this instance whose elements have an abstract value that fulfills the criterion.

Syntax

```
CxQL
public CxList FindByAbstractValue (Func<IAbstractValue, bool> criterion)
```

Parameters

criterion

Lambda method that can filter required items from this CxList according to their abstract value. This function have one parameter of type IAstractValue and returns bool.

Return Value

A subset of this instance whose elements have match the requested creterion.

Exceptions

Exception type	Condition

Example 1

```
CxQL

Find all DOM elements whose abstract value is an integer inside the interval [0,10]
IAbstractValue intervalZeroToTen = new IntegerIntervalAbstractValue(0,10);
CxList res = All.FindByAbstractValue(abstractValue =>
                        abstractValue.IncludedIn(intervalZeroToTen,true));


Find all DOM elements for which the integer 0 in inside their abstract value
IAbstractValue zero = new IntegerIntervalAbstractValue(0);
CxList res = All.FindByAbstractValue(abstractValue =>
                                    zero.IncludedIn(abstractValue));


Find all DOM elements whose abstract value has a given type
CxList res = All.FindByAbstractValue(abstractValue =>
                                    abstractValue is StringAbstractValue);
```

Example 2

```
CxQL

The input source code is:
 int counter = 0;
 int x = counter + 5;
 string str = "a";
 string secondStr = str + "b";
CxList a = All. FindByAbstractValue(abstractValue =>
                 abstractValue is IntegerIntervalAbstractValue);
CxList b = All. FindByAbstractValue (abstractValue =>
                 abstractValue is StringAbstractValue);

result = a;
// result now holds 0, '+', 'counter' and 5  in
 int counter = 0;
 int x = counter + 5;
result = b;
// result now holds "a", '+', 'str' and "b" in
 string str = "a";
 string secondStr = str + "b";
```

Example 3

```
CxQL

The input source code is:
 var y;
 int counter = 0;
 int x = counter + 5;
 y();
IAbstractValue zeroAbsValue = new IntegerIntervalAbstractValue(0);
result = All. FindByAbstractValue(abstractValue =>
                zeroAbsValue.IncludedIn(abstractValue));
/* result now holds 0 and 'counter' in
   int x = counter + 5;
   And also contains y in: (because y has AnyAbstractValue which includes 0)
   y();
*/

result = All. FindIncludedAbstractValue(abstractValue =>
                zeroAbsValue.IncludedIn(abstractValue,true));
// result now holds 0 and 'counter' in
 int x = counter + 5;
// it does not contain y because we asked for strictTypeMatch
```

Example 4

```
CxQL

The input source code is:
 int counter = 0;
 int x = counter + 5;
 function foo() {} // void method
 foo();
IAbstractValue zeroToFiveAbsValue = new IntegerIntervalAbstractValue(0,5);
result = All. FindIncludedInAbstractValue(abstractValue =>
                abstractValue.IncludedIn(zeroToFiveAbsValue));
/* result now holds 0, 5, 'counter' and the sum (counter + 5) in
   int counter = 0;
   int x = counter + 5;
   And also contains foo in:
   foo (); // because y has AnyAbstractValue which includes [0,5]
*/

result = All. FindIncludedInAbstractValue(abstractValue =>
                abstractValue.IncludedIn(zeroToFiveAbsValue, true));
// result now holds 0, 5, 'counter' and the sum of (counter + 5) in
   int x = counter + 5;
// it does not contain foo because we asked for strictTypeMatch
```

Version Information

Supported from 8.6.0

5.148.2 CxList.FindByAbstractValues Method (CxList sources)

Returns a CxList which is a subset of this instance whose elements have an abstract value equal to the abstract value of one element in the sources CxList.

Syntax

```
CxQL
```

```
public CxList FindByAbstractValues(CxList sources)
```

Parameters

sources

A CxList.

Return Value

A subset of this instance whose elements have an abstract value equal to the abstract value of one element in the sources CxList.

Exceptions

Exception type	Condition

Example

```
CxQL

The input source code is:
 string str = "a";
 string secondStr = str + "b";
result = All.FindByAbstractValues(All.FindByType(typeof(StringLiteral)));
// result now holds "a", 'str' and "b" in
 string str = "a";
 string secondStr = str + "b";
```

Version Information

Supported from 8.4.2

5.149 Scan Provider Methods

5.149.1 cxScan.IsFrameworkActive Method (string frameworkName)

Returns bool if requested framework present in scaned project..

Syntax

```
CxQL
public bool IsFrameworkActive (string frameworkName)
```

Parameters

string

Name of requested framework

Return Value

True → requested framework present in this project.

False → othewise

Exceptions

Exception type	Condition

Example

```
CxQL
```

```
Implementation of query JavaScript Kony_Code_Injection

if(cxScan.IsFrameworkActive("Kony"))
{
	CxList inputs = Kony_UI_Inputs();
	CxList Eval = Find_Outputs_CodeInjection();
	CxList sanitize = Code_Injection_Sanitize();
	and etc.
}

if “Kony” framework present →this query do something, otherwise do nothing
You can test existing of every framework.
```

Version Information

Supported from 8.6.0

5.149.2 cxScan.GetScanProperty Method (string key)

Returns string with a value of requested property..

Syntax

```
CxQL
public string GetScanProperty (string key)
```

Parameters

string

Name of requested property, currently only `projectPath` property supported.

Return Value

If requested property exists → value of requested property will be returned.

Otherwise empty string will be returned.

Exceptions

Exception type	Condition

Example

```
CxQL


string projectPath = cxScan.GetScanProperty("projectPath");

string projectPath contains value of “projectPath” property.
```

Version Information

Supported from 8.6.0

5.150 CxList CxXPath Methods

5.150.1 IEnumerable<CxXmlDoc> GetXmlFiles Method (string filter, bool IgnoreNamespaces = false)

Returns an enumerated list of XML files filtered according to the first parameter.

Syntax

```
CxQL
public IEnumerable<CxXmlDoc> GetXmlFiles (string filter, bool IgnoreNamespaces =
false)
```

Parameters

string

File extension pattern to be used as filter.

bool

Specifies whether the search should ignore the namespaces. This field is not required and its default value is false.

Return Value

Returns an enumerated list of XML files.

Exceptions

Exception type	Condition

Example

```
CxQL

IEnumerable xmlDoc = cxXpath.GetXmlFiles("*.cx", true);

Returns an enumerated list of XML files filtered by "*.cx"
```

Version Information

Supported from 8.6.0

5.150.2 CxList CreateXmlNode Method (XPathNavigator input, CxXmlDoc xmlDoc, int language, bool save, int depth = 1)

Return a CxList composed by CxXmlNode.

Syntax

```
CxQL
public CxList CreateXmlNodes(XPathNavigator input, CxXmlDoc xmlDoc, int language,
bool save, int depth = 1)
```

Parameters

XPathNavigator

Provides a cursor model for navigating XML data.

CxXmlDoc

Document where the node will be created.

int

Id of the language.

bool

Sprecifies if the node should be saved.

int

Deapth of search. Default value is 1.

Return Value

Return a CxList with CxXmlNodes for the given XPath.

Exceptions

Exception type	Condition

Example

```
CxQL

// create an XPathDocument object
XPathDocument xmlPathDoc = new  XPathDocument(xmlFileName);

// create a navigator for the xpath doc
XPathNavigator xNav = xmlPathDoc.CreateNavigator();

result = cxXPath.CreateXmlNodes(xNav, xmlDoc, 1, false, 1);

Returns a CxList of nodes in a given CxXmlDoc.
```

Version Information

Supported from 8.6.0

5.150.3 CxList FindXmlNodesByQualifiedName Method (string xmlFilterFiles, int language, string prefix, string nodeName, bool includeAttributes, string attributeName = "", string attributeValue = "", bool usesRegex = false, bool ignoreCase = false)

Return a CxList with CxXmlNode elements following the values defined by the parameters.

Syntax

```
CxQL
public CxList FindXmlNodesByQualifiedName(string xmlFilterFiles, int language,
string prefix, string nodeName, bool includeAttributes, string attributeName “”,
string attributeValue = “”, bool usesRegex = false, bool ignoreCase = false)
```

Parameters

string

File extension pattern to be used as filter.

int

Id of the language.

string

The name of the prefix.

string

The name of the node.

bool

Specifies if the search should include attributes. This field is not required and its default value is false.

string

The name of the attribute. This field is not required.

string

The value of the attribute. This field is not required.

bool

Specifies if the search should use regex. This field is not required and its default value is false.

bool

Specifies if the search should be case sensitive. This field is not required and its default value is false.

Return Value

Return a CxList with CxXmlNode elements.

Exceptions

Exception type	Condition

Example

```
CxQL

The input source code is:
 <aura:attribute name="href" type="String" default="null"/>

result = cxXPath.FindXmlNodesByQualifiedName("*Test.app",8, "aura", "type");
// Result now holds the entire tag block
```

Version Information

Supported from 8.6.0

5.150.4 CxList FindXmlNodesByQualifiedNameAndValue Method (string xmlFilterFiles, int language, string prefix, string nodeName, string nodeValue, bool usesRegexForNodeValue = false, bool ignoreCase = false)

Returns a CxList with CxXmlNode elements that contain the same name and value defined in the parameters.

Syntax

```
CxQL
public CxList FindXmlNodesByQualifiedNameAndValue(string xmlFilterFiles, int
language, string prefix, string nodeName, string nodeValue, bool
usesRegexFornodeValue = false, bool ignoreCase = false)
```

Parameters

string

File extension pattern to be used as filter.

int

Id of the language.

string

The name of the prefix.

string

The name of the node.

string

The value of the node.

bool

Specifies if the search should use regex for the node value. This field is not required and its default value is false.

bool

Specifies if the search should be case sensitive. This field is not required and its default value is false.

Return Value

Return a CxList with CxXmlNode elements.

Exceptions

Exception type	Condition

Example

```
CxQL

The input source code is:
 <aura:attribute name="href" type="String" default="null">
       {!userManager.isAuthorized}
 <aura:attribute/>


result = cxXPath. FindXmlNodesByQualifiedNameAndValue("*Test.app", 8, "aura",
"attribute", “userManager.isAuthorized”);

// Result now holds the entire tag block
```

Version Information

Supported from 8.6.0

5.150.5 CxList FindXmlNodesByLocalName Method (string xmlFilterFiles, int language, string nodeName, bool includeAttributes = false, string attributeName = "", string attributeValue = "", bool usesRegex = false, bool ignoreCase = false)

Returns a CxList with CxXmlNode elements that contain the same local name defined in the parameters.

Syntax

```
CxQL
public CxList FindXmlNodesByLocalName(string xmlFilterFiles, int language, string
nodeName, bool includeAttributes = false, string attributeName = "", string
attributeValue = "", bool usesRegex = false, bool ignoreCase = false)
```

Parameters

string

File extension pattern to be used as filter.

int

Id of the language.

string

The name of the node.

bool

Specifies whether the search includes the attributes. This field is not required and its default value is false.

string

The name of the attribute. This field is not required.

string

The value of the attribute. This field is not required.

bool

Specifies if the search should use regex. This field is not required and its default value is false.

bool

Specifies if the search should be case sensitive. This field is not required and its default value is false.

Return Value

Return a CxList with CxXmlNode elements.

Exceptions

Exception type	Condition

Example

```
CxQL


The input source code is:
 <a href="{!obj.href}">click me</a>

result = cxXPath. FindXmlNodesByLocalName("*.cmp", 8, "a", true, "href",
"[{][!][^}]+[}]", true, true);

// Result now holds the entire tag block
```

Version Information

Supported from 8.6.0

5.150.6 CxList FindXmlNodesByLocalNameAndValue Method (string xmlFilterFiles, int language, string nodeName, string nodeValue, bool usesRegexForNodeValue = false, bool ignoreCase = false)

Returns a CxList with CxXmlNode elements that contain the same local name and value defined in the parameters.

Syntax

```
CxQL
public CxList FindXmlNodesByLocalNameAndValue(string xmlFilterFiles, int
language, string nodeName, string nodeValue, bool usesRegexForNodeValue = false,
bool ignoreCase = false)
```

Parameters

string

File extension pattern to be used as filter.

int

Id of the language.

string

The name of the node.

string

The value of the node.

bool

Specifies if the search should use regex for the node value. This field is not required and its default value is false.

bool

Specifies if the search should be case sensitive. This field is not required and its default value is false.

Return Value

Returns a CxList with CxXmlNode elements.

Exceptions

Exception type	Condition

Example

```
CxQL

The input source code is:
 <a href="{!obj.href}">click me</a>

result = cxXPath. FindXmlNodesByLocalNameAndValue("*.cmp", 8, "a", “click me”,
true, "href", "[{][!][^}]+[}]", true, true);

// Result now holds the entire tag block
```

Version Information

Supported from 8.6.0

5.150.7 CxList FindXmlAttributesByName Method (string xmlFilterFiles, int language, string attributeName, bool ignoreCase = false)

Returns a CxList with CxXmlNode elements that contain attributes with the same name defined in the parameters.

Syntax

```
CxQL
public CxList FindXmlAttributesByName(string xmlFilterFiles, int language, string
attributeName, bool ignoreCase = false )
```

Parameters

string

File extension pattern to be used as filter.

int

Id of the language.

string

The name of the attribute.

bool

Specifies if the search should be case sensitive. This field is not required and its default value is false.

Return Value

Return a CxList with CxXmlNode elements.

Exceptions

Exception type	Condition

Example

```
CxQL

The input source code is:
 <div id="error-section"></div>

result = cxXPath. FindXmlAttributesByName("*.app", 8, "id", true);

// Result now holds the entire tag block
```

Version Information

Supported from 8.6.0

5.150.8 CxList FindXmlAttributesByValue Method (string xmlFilterFiles, int language, string attributeValue, bool usesRegex = false)

Returns a CxList with CxXmlNode elements that contain attributes with the same value defined in the parameters.

Syntax

```
CxQL
public CxList FindXmlAttributesByValue(string xmlFilterFiles, int language,
string attributeValue, bool usesRegex = false)
```

Parameters

string

File extension pattern to be used as filter.

int

Id of the language.

string

The value of the attribute.

bool

Specifies if the search should use regex.

Return Value

Return a CxList with CxXmlNode elements.

Exceptions

Exception type	Condition

Example

```
CxQL

The input source code is:
 <div id="error-section"></div>

result = cxXPath.FindXmlAttributesByValue("*.app",8,"error-section", false);
```

```
// Result now holds the entire tag block
```

Version Information

Supported from 8.6.0

5.150.9 CxList FindXmlAttributesByNameAndValue Method (string xmlFilterFiles, int language, string attributeName, string attributeValue, bool usesRegex = false, bool ignoreCase = false)

Returns a CxList with CxXmlNode elements that contain attributes with the same name and value defined in the parameters.

Syntax

```
CxQL
public CxList FindXmlAttributesByNameAndValue(string xmlFilterFiles, int
language, string attributeName, string attributeValue, bool usesRegex = false,
bool ignoreCase = false)
```

Parameters

string

File extension pattern to be used as filter.

int

Id of the language.

string

The name of the attribute.

string

The value of the attribute.

bool

Specifies if the search should use regex.

bool

Specifies if the search should be case sensitive. This field is not required and its default value is false.

Return Value

Return a CxList with CxXmlNode elements.

Exceptions

Exception type	Condition

Example

```
CxQL

The input source code is:
 <div id="error-section"></div>

result = cxXPath. FindXmlAttributesByNameAndValue("*.app", 8, “id”, "error-
section", false, true);

// Result now holds the entire tag block
```

Version Information

Supported from 8.6.0

5.150.10 Void AddSupportForExpressionLanguageForFramework (string framework)

Sets the support for expression language for the framework to ture. Must be done at least once in a scan before running cxxPAth queries for expression language.

Syntax

```
CxQL
public void AddSupportForExpressionLanguageForFramework (string framework)
```

Parameters

string

The name of the framework

Exceptions

Exception type	Condition

Example

```
CxQL

The input source code is:
<aura:component >
    <aura:attribute name="src" type="String"
default="javascript:alert(document.cookie)"/>
                                                    Attribute test in CSP
mode (LEX)
    <iframe src="{!v.src}"></iframe>
</aura:component>

       cxXPath.AddSupportForExpressionLanguageForFramework("Lightning");
// will set the support of the lightning expression language to true
```

Version Information

Supported from 8.9.0

5.150.11 public CxList FindAllAttributesThatHoldExpressions(string xmlFilterFiles, int language, string framework)

Returns a CxList with CxXmlNode elements that contain nodes that have hold expressions as an attribute value.

Syntax

```
public CxList FindAllAttributesThatHoldExpressions(string xmlFilterFiles, int
language, string framework)
```

Parameters

string

File extension pattern to be used as filter.

int

Id of the language.

string

The name of the framework

Return Value

Return a CxList with CxXmlNode elements.

Exceptions

Exception type	Condition
NullReferenceException	**parameter is a null reference**

Example

```
CxQL

<ui:button label="Get custom objects" press="{!c.get_objs}"/>
result=cxXPath.FindAllAttributesThatHoldExpressions("*.cmp", 8, "Lightning");
// Result now holds the attribute which value is an expression (“press” CxXml
node)
```

Version Information

Supported from 8.9.0

5.150.12 public CxList GetTextNodesExpressions(string xmlFilterFiles, string framework, int language)

Returns a CxList with all the expressions that are located in XML text for a given framework

Syntax

```
public CxList GetTextNodesExpressions(string xmlFilterFiles, string
framework, int language)
```

Parameters

string

File extension pattern to be used as filter.

string

The name of the framework

int

Id of the language.

Return Value

A CxList which contains expressions that are located inside the XML text

Exceptions

Exception type	Condition
NullReferenceException	**parameter is a null reference**

Example

```
CxQL
```

```
<p><a href="{!obj.Phone}">Phone of {!obj.Name}</a></p>

result  =  cxXPath.GetTextNodesExpressions("*.cmp", "Lightning", 8);

// Result now holds the Member Access of “Name”
```

Version Information

Supported from 8.9.0

5.150.13 public CxList createAttributesDefinition(string xmlFilterFiles, int language, string framework)

Returns a CxList with elements that will represent a Declarators of a framework specific variable definitions.

Syntax

```
public CxList createAttributesDefinition(string xmlFilterFiles, int language,
string framework)
```

Parameters

string

File extension pattern to be used as filter.

int

Id of the language.

string

The name of the framework

Return Value

A CxList which contains a set of Declarators that are specific for a given framework

Exceptions

Exception type	Condition
NullReferenceException	**parameter is a null reference**

Example

```
CxQL

    <aura:attribute name="accounts" type="Account[]"/>

result=cxXPath.createAttributesDefinition("*.cmp", 8, "Lightning");

// Result now holds Declarator of a variable of name “accounts” of type
“Account[]” and of private accessibility
```

Version Information

Supported from 8.9.0

5.150.14 public CxList GetXMLNodeDescendents(CxList originNodes, CxList descendentExpressionGroup)

Returns a CxList which is a subset of descendentExpressionGroup and is a XML DOM descendent of CxXML originNodes

Syntax

```
public CxList GetXMLNodeDescendents(CxList originNodes, CxList
descendentExpressionGroup)
```

Parameters

CxList

A list of CxXML elements which would serve as the scope to look under

CxList

A list of Expressions from which the Descendants will be extracted

Return Value

A CxList which is a subset of descendentExpressionGroup and is a XML DOM descendent of CxXML originNodes

Exceptions

Exception type	Condition
NullReferenceException	**parameter is a null reference**

Example

```
CxQL

    <aura:iteration var="obj" items="{!v.saccounts}">
    <p>
<a href="{!obj.Name}">{!'Name of ' + obj.Name}</a></p>
        <p><a href="{!obj.Phone}">Phone of {!obj.Name}</a></p>
    </aura:iteration>
CxList iteration = cxXPath.CreateIterationVarDefinition("*.cmp", 8,
"Lightning");
       CxList elementOfDeclarator =
cxXPath.GetElementOfCreatedDeclaration(iteration);
       CxList desc = cxXPath.GetXMLNodeDescendents(elementOfDeclarator,
allExpressionsInProject);

// Assumming that allExpressionsInProject will hold all expressions in the
framework, result will contain the expressions for obj.Name MemberAccesses ,
Obj.Phone MemberAccesses and a binaryExpression (in total 4 CxList results)
```

Version Information

Supported from 8.9.0

5.150.15 public CxList GetAllExpressionDescendents(CxList descendentExpressionGroup, int language)

Returns a CxList which is all descendants of the the descendentExpressionGroup

Syntax

```
public CxList GetAllExpressionDescendents(CxList descendentExpressionGroup, int
language)
```

Parameters

CxList

The Ancestors whose descendants are to be returned

int

Id of the language.

Return Value

Returns all elements that descends any of the elements in the descendentExpressionGroup parameter

Exceptions

Exception type	Condition

Example

```
CxQL

<iframe src="{!'https:' + v.frameSrc}">iframe</iframe>

CxList attr=cxXPath.FindAllAttributesThatHoldExpressions("*.cmp", 8,
"Lightning");
CxList expr=cxXPath.GetExpressionsByAttributes(attr);
result=cxXPath.GetAllExpressionDescendents(expr,8);
// will return 4 results (binaryExpr, StringLiteral, MemberAccess,
UnknownReference).
```

Version Information

Supported from 8.9.0

5.150.16 public CxList GetElementOfCreatedDeclaration(CxList declarations)

Returns a CxList with CxXmlNode elements that are DOM related to framework created Declarators

Syntax

```
public CxList GetElementOfCreatedDeclaration(CxList declarations)
```

Parameters

CxList

A list of XML framework related Declarators

Return Value

A CxList with CxXmlNode elements that are DOM related to framework created Declarators

Exceptions

Exception type	Condition
NullReferenceException	**parameter is a null reference**

Example

```
CxQL
```

```
    <aura:attribute name="Id" type="String" access="Private" default="nil"/>

CxList declarators=cxXPath.createAttributesDefinition("*.cmp", 8, "Lightning");
result=cxXPath.GetElementOfCreatedDeclaration(declarators);

// result will contain “attribute” CxXmlNode element
```

Version Information

Supported from 8.9.0

5.150.17 public CxList GetAttributeByExpression(CxList expression)

Returns a CxList with CxXmlNode attributes that are DOM related (key of expression) to the expressions given as a parameter

Syntax

```
public CxList GetAttributeByExpression(CxList expression)
```

Parameters

CxList

A list of expressions that appear as a value to an XML attribute

Return Value

A CxList with CxXmlNode attributes that are DOM related (key of expression) to the expressions given as a parameter

Exceptions

Exception type	Condition
NullReferenceException	**parameter is a null reference**

Example

```
CxQL

    <iframe src="{!v.src}"></iframe>

CxList AllAttributesThatHoldExpressions =
cxXPath.FindAllAttributesThatHoldExpressions("*.cmp", 8, "Lightning");
CxList expression =
cxXPath.GetExpressionsByAttributes(AllAttributesThatHoldExpressions);
result = cxXPath.GetAttributeByExpression(expression);

// result will contain one CxXML node for “src” attribute
```

Version Information

Supported from 8.9.0

5.150.18 public CxList GetExpressionsByAttributes(CxList attributes)

Returns a CxList of expressions that are DOM related to the attributes parssed as param (given a key of attributes will return a set of expressions that are their values).

Syntax

```
public CxList GetExpressionsByAttributes(CxList attributes)
```

Parameters

CxList

A list of attributes that have an expression as a vlue

Return Value

A CxList of expressions that are DOM related to the attributes parssed as param

Exceptions

Exception type	Condition
NullReferenceException	**parameter is a null reference**

Example

```
CxQL

    <iframe src="{!v.src}"></iframe>

CxList AllAttributesThatHoldExpressions =
cxXPath.FindAllAttributesThatHoldExpressions("*.cmp", 8, "Lightning");
Result= cxXPath.GetExpressionsByAttributes(AllAttributesThatHoldExpressions);

// result will return a MemberAccess “src”
```

Version Information

Supported from 8.9.0

5.150.19 public CxList GetElementByExpression(CxList expressions)

Returns a CxList of CxXmlNode that hold the element that is DOM related to a given expression.

Syntax

```
public CxList GetElementByExpression(CxList expressions)
```

Parameters

CxList

A list of expressions

Return Value

A CxList of CxXmlNode that hold the element that is DOM related to a given expression

Exceptions

Exception type	Condition
NullReferenceException	**parameter is a null reference**

Example

```
CxQL

    <iframe src="{!v.src}"></iframe>

CxList AllAttributesThatHoldExpressions =
cxXPath.FindAllAttributesThatHoldExpressions("*.cmp", 8, "Lightning");
```

```
CxList exp=
cxXPath.GetExpressionsByAttributes(AllAttributesThatHoldExpressions);
result= cxXPath.GetElementByExpression(exp);

// result will contain the CxXMlNode for iframe element.
```

Version Information

Supported from 8.9.0

5.150.20 public CxList CreateIterationVarDefinition(string xmlFilterFiles, int language, string framework)

Returns a CxList with elements that will represent a Declarators of a framework specific iteration statement.

Syntax

```
public CxList CreateIterationVarDefinition(string xmlFilterFiles, int language,
string framework)
```

Parameters

string

File extension pattern to be used as filter.

int

Id of the language.

string

The name of the framework

Return Value

A CxList which contains a set of Declarators that are specific for a given framework

Exceptions

Exception type	Condition
NullReferenceException	**parameter is a null reference**

Example

```
CxQL

    <aura:iteration var="obj" items="{!v.customobjects}">

result=cxXPath.CreateIterationVarDefinition ("*.cmp", 8, "Lightning");

// Result now holds Declarator of a variable of name “obj” of type relevant to
customobjects and of private accessibility
```

Version Information

Supported from 8.9.0

5.151 CxList CxJson Methods

5.151.1 CxList FindJsonPropertyByName Method (string filesFilter, int language, string name, bool usesRegex = false, bool ignoreCase = false)

Return a CxList with CxJsonProperty elements following the values defined by the parameters.

Syntax

```
CxQL
public CxList FindJsonPropertyByName (string filesFilter, int language, string
name, bool usesRegex  = false, bool ignoreCase = false)
```

Parameters

string

File extension pattern to be used as filter.

int

Id of the language.

string

The name of the property.

bool

Specifies whether the search should use regex. This field is not required and its default value is false.

bool

Specifies whether the search should be case sensitive. This field is not required and its default value is false.

Return Value

Return a CxList with CxJsonProperty elements

Exceptions

Exception type	Condition

Example

```
CxQL

{
  "proxies": {
    "default": {
      "httpProxy": "http://10.0.50.1:3128",
      "httpsProxy":  "http://10.0.50.1:3128"
    }
  }
}

result=cxJson.FindJsonPropertyByName("config.json", 8, "proxy$", true, true);

// Result now holds two CxJsonProperty
```

Version Information

Supported from 9.2.0

5.151.2 CxList FindJsonPropertyByValue Method (string filesFilter, int language, string value, bool usesRegex = false, bool ignoreCase = false)

Return a CxList with CxJsonProperty elements following the values defined by the parameters.

Syntax

```
CxQL
public CxList FindJsonPropertyByValue (string filesFilter, int language, string
value, bool usesRegex  = false, bool ignoreCase = false)
```

Parameters

string

File extension pattern to be used as filter.

int

Id of the language.

string

The value of the property.

bool

Specifies whether the search should use regex. This field is not required and its default value is false.

bool

Specifies whether the search should be case sensitive. This field is not required and its default value is false.

Return Value

Return a CxList with CxJsonProperty elements

Exceptions

Exception type	Condition

Example

```
CxQL

{
  "proxies": {
    "default": {
      "httpProxy": "http://10.0.50.1:3128",
      "httpsProxy":  "http://10.0.50.1:3128"
    }
  }
}

result=cxJson.FindJsonPropertyByValue("*.json", 8, "^http", true, false);

// Result now holds two CxJsonProperty
```

Version Information

Supported from 9.2.0

5.151.3 CxList FindJsonPropertyByNameAndValue Method (string filesFilter, int language, string name, string value, bool usesRegex = false, bool ignoreCase = false)

Return a CxList with CxJsonProperty elements following the values defined by the parameters.

Syntax

```
CxQL
public CxList FindJsonPropertyByNameAndValue (string filesFilter, int language,
string name, string value, bool usesRegex  = false, bool ignoreCase = false)
```

Parameters

string

File extension pattern to be used as filter.

int

Id of the language.

string

The name of the property.

string

The value of the property.

bool

Specifies whether the search should use regex. This field is not required and its default value is false.

bool

Specifies whether the search should be case sensitive. This field is not required and its default value is false.

Return Value

Return a CxList with CxJsonProperty elements

Exceptions

Exception type	Condition

Example

```
CxQL

{
  "proxies": {
    "default": {
      "httpProxy": "http://10.0.50.1:3128",
      "httpsProxy":  "http://10.0.50.1:3128"
    }
  }
}

result=cxJson.FindJsonPropertyByNameAndValue("*.json", 8, "^https", “^http:”,
true, false);

// Result now holds one CxJsonProperty
```

Version Information

Supported from 9.2.0

6 Method Documentation (for internal use only)

6.1 CxList.SetQueryProperty Method (QueryProperties.propertyEnum, QueryProperties.flowDirectionEnum)

Adds/modifies a query property of the current query

Syntax

```
CxQL
public static void SetQueryProperty (QueryProperties.propertyEnum queryProperty,
QueryProperties.flowDirectionEnum directionValue)
```

Parameters

queryProperty

enum of query properties: `FLOW_DIRECTION`

directionValue

enum of flow direction: `From_Small_To_Large = 1, From_Large_To_Small, From_Start, From_End`

Exceptions

Exception type	Condition

Example

```
CxQL

SetQueryProperty(QueryProperties.propertyEnum.FLOW_DIRECTION,
QueryProperties.flowDirectionEnum.From_Start); //makes the calculation of flows
be from start node to end node.
```

Version Information

Supported from 8.0.0

6.2 CxList.GetSanitizerByMethodInCondition Method (CxList)

For each input method, finds all the calls inside a "if" condition and returns all the references, of the methods parameters, that are inside the "if" statement.

Syntax

```
CxQL
public CxList GetSanitizerByMethodInCondition(CxList MethodCallsInCondition)
```

Parameters

MethodCallsInCondition

method call list inside "if" condition (must be of type MethodInvoke)

Return Value

all references of a method call parameter in the scope of the if statement

Example

```
This example demonstrates the CxList.GetSanitizerByMethodInCondition(CxList
MethodCallsInCondition) method.
 The input source code is:
       String a = getInput();
       if(Valid(a)){
              Print(a);
       }

CxList valid = All.FindByShortName("Valid");
result = All.GetSanitizerByMethodInCondition(valid);

the result would consist of 1 item:
            a (in Print(a))
The purpose of the query is to mark 'a' as a sanitizer, because the flow doesn't
pass through the condition.
```

Remarks

Calls GetSanitizerByMethodInCondition(MethodCallsInCondition, IfBlock.Both).

Version Information

Supported from 7.1.2

6.3 CxList.GetSanitizerByMethodInCondition Method (CxList, IfBlock)

For each method, finds all the calls inside a "if" condition and returns all the references, of the methods parameters, that are inside the "if" block (the IfBlock input parameter) statement.

Syntax

```
CxQL
public CxList GetSanitizerByMethodInCondition(CxList MethodCallsInCondition,
IfBlock block)
```

Parameters

MethodCallsInCondition

method call list inside "if" condition (must be of type MethodInvoke)

block

select only "true", only "false" or both scopes.

Return Value

all references of a method call parameter in the scope of the if statement

Example

```
This example demonstrates the CxList.GetSanitizerByMethodInCondition(CxList
MethodCallsInCondition, IfBlock block) method.
 The input source code is:
       String a = getInput();
       if(Valid(a)){
              Print(a);
       }

CxList valid = All.FindByShortName("Valid");
```

```
result = All.GetSanitizerByMethodInCondition(valid,CxList.IfBlock.True);

the result would consist of 1 item:
            a (in Print(a))
The purpose of the query is to mark 'a' as a sanitizer, because the flow doesn't
pass through the condition.
```

Version Information

Supported from 7.1.2

7 CxList Operators

The operators of the **CxList** class are listed here.

Public Operators

== Operator	Determines whether two specified CxList objects have the same values.
!= Operator	Determines whether two specified CxList objects do not have the same values (they differ by a least one value).
+ Operator	Merges two specified CxList objects (same as | operator)
- Operator	Removes the values of second specified CxList object from the first one.
& Operators	Intersects the values of the two specified CxList objects (same as * operator)
| Operator	Merges two specified CxList object (same as + operator)
* Operator	Intersects the values of the two specified CxList objects (same as & operator)
< Operator	Return true if the first specified CxList is completely contained within the second one.
> Operator	Return true if the second specified CxList is completely contained within the first one.
<= Operator	Return true if the first specified CxList is completely contained within the second one or they are equal.
=> Operator	Return true if the second specified CxList is completely contained within the first one or they are equal.

8 CxQuery Miscellaneous Methods

8.1 cxLog.WriteDebugMessage Method (string)

Display string to DebugMessages tab in CxAudit program

Syntax

```
CxQL
public void cxLog.WriteDebugMessage(string str)
```

Parameters

String to be displayed.

Return Value

none.

Exceptions

Exception type	Condition
ArgumentNullException	**parameter is a null reference**

Remarks

All calling to cxLog.WriteDebugMessage should be removed from production version!!!

It also prints the debug message into the CxSAST log file (even outside CxAudit).

Example

The following code example shows how you can use the cxLog.WriteDebugMessage method.

```
CxQL

This example demonstrates the cxLog.WriteDebugMessage method.
The input source code is:
 class cl1
 {
      void foo()
      {
            int a = 3;
            int b = 5;
      }
 }
result = All.FindByShortName("foo");
if (result.Count > 0)
       cxLog.WriteDebugMessage(result.GetFirstGraph().ShortName);
       cxLog.WriteDebugMessage ("number of DOM elements =" + All.Count);

the result would be - on DebugMessage tab in CxAudit program
       foo
       number of DOM elements = 14
```

Version Information

Supported from v1.8.1

9 Appendix A. CxDOM Types

The built-in types in CxDOM are listed here:

Types	Types (cont.)	Types(Cont.)
AccessorDecl	DelegateInvokeExpr	OperatorDecl
AccessorModifiers	DestructorDecl	OverloadableOperator
ArgumentRef	DictionaryCreateExpr	Param
ArrayCreateExpr	DictionaryInitializer	ParamDecl
ArrayElementRef	EnumDecl	ParamDirection
ArrayInitializer	EnumMemberDecl	PointerTypeRef
AssemblyReference	EventDecl	PostfixExpr
AssignExpr	EventRef	PostfixOperator
AssignOperator	ExprStmt	PropertyDecl
AssociativeArrayExpr	FieldDecl	PropertyRef
AssociativeArrayPropertyEntry	FieldRef	PropertySetValueRef
AssociativeArrayRegularEntry	ForEachStmt	RankSpecifier
AttachDelegateStmt	FunctionTypeRef	RealLiteral
AttributeTarget	GenericsConstraints	RemoveDelegateStmt
BaseRef	GenericTypeRef	ReturnStmt
BinaryExpr	GotoStmt	SliceExpression
BinaryOperator	GraphTypes	StringLiteral
BooleanLiteral	IfStmt	StructDecl
BreakStmt	Import	SubExpr
BuiltInType	IndexerDecl	SwitchStmt
Case	IndexerRef	TernaryExpr
CastExpr	IntegerLiteral	ThisRef
Catch	InterfaceDecl	ThrowStmt
CharLiteral	IterationStmt	TryCatchFinallyStmt
CheckedStmt	IterationType	TupleCreateExpr
ClassDecl	LabeledStmt	TupleInitializer
CodeCollectionAttribute	LambdaExpr	TypeKind
CodeElementAttribute	LinePragma	TypeModifiers
Comment	LocalRef	TypeOfExpr
CommentStmt	LockStmt	TypeRef
ConstantDecl	MemberAccess	UnaryExpr
ConstantDeclStmt	MemberKind	UnaryOperator
ConstructorDecl	MethodDecl	UncheckedStmt
ContinueStmt	MethodInvokeExpr	UnknownReference
CreateDelegateExpr	MethodRef	UsingStmt
CustomAttribute	Modifiers	VariableDecl
CxXmlNode	NamespaceDecl	VariableDeclStmt
Declarator	NullLiteral	

Types	Types (cont.)	Types(Cont.)
DelegateDecl	ObjectCreateExpr	

Example

In order to better understand each of these types, try the following query:

```
CxQL

result = All.FindByType(typeof(IfStmt));
"IfStmt" is one of the above types.
```