CDG Reference Manual

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Contents

Chapter 1

The CDG Reference Manual

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1.1 Purpose of this document

This document is a thorough description of all data structures and functions used in the CDG system and serves as a technical documentation of the parser.

Most of the core functionality is exported by the modules in the directory `libcdg`, which can be viewed as yet another C library, although a very specialized one. Application-specific functionality must be implemented by the application that uses the `libcdg` library. Thus, the command-line parser `cdgp` includes code to parse its command-line options and to do I/O on a terminal, and the graphical parser `xcdg` defines extensive routines to display input structures graphically. This document will eventually cover all data structures and functions of the constraint parsing library `libcdg` and the text-based parser `cdgp`.

`CDG` is written entirely in C (and automatically generated C in some cases). It relies on several non-ANSI extensions to the C programming language (such as local functions and dynamic arrays). The GNU C compiler can compile all of these features; others may or may not.

1.2 Overview

The `CDG` library is organized into several modules each of which offers a specialized service to the environment. The set of all modules can be further divided into those offering the basic infrastructure for `CDG` parsing whereas others are build on top and offer the different parsing flavours that are available.

1.2.1 Basic Modules

- Cdg - The Root Module: This the root layer of the `CDG` library.
- Chunker - Interface to a Chunking Parser: This module offers an interface for an external chunker.
- Cdgdb - Get lexical entries out of a berkeley database: This module provides access to a berkeley database for retrieving lexical entries.
- Command - The CDG Scripting Language: This module implements the `CDG` scripting interface.

- Compiler - compile a constraint grammar: This module implements a compiler in order to translate constraints into C code.
- Constraintnet - maintainance of constraint nets: Herein the basic and most central datastructure of CDG is implemented, the ConstraintNet.
- Eval - routines to evaluate constraint formulas: The Eval module actually implements the constraint interpreter
- ref Functions: Implementation of all function calls
- Hook - A callback system: The Hook module connects the core of the library to its outside world by a callback mechanism.
- ref Input:This module defines the data structures and access functions for constraint grammar.
- ref Interpreter: This module implements the constraint grammar language it consists of the following submodules
- ref Levelvalue
- Lexemgraph - maintainance of lexem graphs
- ref Parse
- ref Predicates: Implementation of all predicates
- Scache - Cache structures for binary LV scores
- Scorematrix - The matrix of scores appearing in each ConstraintEdge: This module implements the score matrix for a constraint edge.
- ref Set: This module provides a uniform interface for all user-visible variables.
- ref Statistics
- ref Tagger
- ref Testing
- Timer - timekeeping functions
- ref Variables: This module provides a generic interface for variable encapsulation, and is exclusively used by the set module.
- ref Write

1.2.2 Parsing Flavours

- ref Arcconsistency
- ref Frobbing
- ref MGLS
- ref Increment
- ref Incrementalcompletion
- ref Netsearch
- ref Nodeconsistency
- ref Search

1.3 General guidelines

1.3.1 File structure

Every module consists of a declaration part <moduleName>.h and an implementation part <moduleName>.c . Another module can use the exported services of this modules by including its declarations in <moduleName>.h . Note that many of the functions covered in this manual are not exported and therefore cannot be used from other modules at all. The files skel.c and skel.h provide a skeleton for a new module.

1.3.2 Terms used in this document

While some of the functions in the libcdg library explicitly use variable-length argument lists, other have a prototype like the following:

```
int no, char **args
```

In this case it is always assumed that *args* is an array of valid zero-terminated strings, and that *no* specifies the number of these strings. This is an alternate way of passing a varying number of additional arguments. The strings contained in the array are called *command* words in this document to distinguish them from the actual function arguments.

1.3.3 Coding style

Most identifiers of data structures and algorithms are complete English phrases such as 'ConstraintNet' or 'printLexiconItem'. When a module deals primarily with one data structure, it is common practice to abbreviate the name of this structure and use it as a prefix to all exported identifiers, as in 'lvNew', 'lvPrint', and 'lvDelete' (rather than 'newLevelValue', 'printLevelValue', and 'deleteLevelValue').

To avoid the explicit use of pointer variables, most modules export typedef 'd aliases for all pointer types. These aliases have meaningful names, while the underlying struct types have names ending in Struct:

```
typedef struct {
   String id;
   Boolean active;
   int counter;
} SectionStruct;
typedef SectionStruct *Section;
```

Although ANSI C allows the programmer to collapse these two typedef statements into one, this construct cannot be parsed by the interface generator SWIG, used for building xcdg. Therefore it is important to use exactly this way of defining pointers to structures.

One consequence of this definition style is that although very few pointer symbols are used in the code, most libcdg data types obey reference semantics: A function called on a variable s can usually change the underlying structure, even though C function calls actually use value semantics.

A more practical demonstration of the coding style is given in Skel - A Skeleton Module.

Chapter 2

CDG Module Index

2.1 CDG Modules

Here is a list of all modules:

Chapter 3

CDG Data Structure Index

3.1 CDG Data Structures

Here are the data structures with brief descriptions:

Chapter 4

CDG Page Index

4.1 CDG Related Pages

Here is a list of all related documentation pages:

Chapter 5

CDG Module Documentation

5.1 Cdg - The Root Module

5.1.1 Detailed Description

Initialization of the CDG system on startup.

This is the so called root module of the library with the following purpose:

- initialization of the CDG system at startup
- finalization at shutdown
- container for globally used functions and definitions
- owner of the symbol table

All other modules depend on this module and include cdg.h

Forward type definitions

This set of declarations help to deal with cirular C-structures which introduce circular header file dependencies as a consequence. All type definitions of that kind are moved to this place here to get a one-stop forward declaration.

- typedef ChunkStruct * Chunk
- typedef ChunkerStruct * Chunker
- typedef ChunkerStruct ChunkerStruct
- typedef ChunkStruct ChunkStruct
- typedef GraphemNodeStruct * GraphemNode
- typedef GraphemNodeStruct GraphemNodeStruct
- typedef LexemNodeStruct * LexemNode
- typedef LexemNodeStruct LexemNodeStruct

Defines

- #define FALSE 0
- #define max(a, b) (a) > (b) ? (a) : (b)
- #define min(a, b) (a) < (b) ? (a) : (b)
- #define NULL 0
- #define TRUE 1

Functions

- void cdgAgInsert (Agenda a, double score, Pointer state)
- void cdgDeleteComputed (void)
- void cdgExecPragmas (List pragmas)
- void cdgFinalize (void)
- void cdgFreeString (String str)
- void cdgInitialize (void)

Variables

- Boolean cdgCtrlCAllowed
- Boolean cdgCtrlCAllowed = FALSE
- Boolean cdgCtrlCTrapped
- Boolean cdgCtrlCTrapped = FALSE
- Boolean cdgEncodeUmlauts
- Boolean cdgEncodeUmlauts = FALSE
- Hashtable cdgNets
- Hashtable cdgNets
- Hashtable cdgParses
- Hashtable cdgParses
- Hashtable cdgProblems
- Hashtable cdgProblems
- unsigned long cdgTimeLimit
- unsigned long cdgTimeLimit = 0
- String cdgUser
- String cdgUser = NULL
- Boolean cdgXCDG
- Boolean cdgXCDG = FALSE

5.1.2 Define Documentation

5.1.2.1 #define FALSE 0

this is false. FALSE has the numeric value 0. Definition at line 215 of file cdg.h.

Referenced by bCompare(), chunkerCommandValidate(), chunkerNew(), cmdActivate(), cmdAnno2Parse(), cmdAnnos2prolog(), cmdAnnotation(), cmdChunk(), cmdCompareParses(), cmdCompile(), cmdConstraint(), cmdDeactivate(), cmdDistance(), cmdEdges(), cmdFrobbing(), cmdHelp(), cmdHierarchy(), cmdHook(), cmdIncrementalCompletion(), cmdInputwordgraph(), cmdISearch(),

cmdLevel(), cmdLevelsort(), cmdLexicon(), cmdLoad(), cmdLs(), cmdNet(), cmdNetdelete(), cmdNetsearch(), cmdNewnet(), cmdNonSpecCompatible(), cmdParsedelete(), cmdParses2prolog(), cmdPrintParse(), cmdPrintParses(), cmdQuit(), cmdRenewnet(), cmdReset(), cmdSection(), cmdSet(), cmdShift(), cmdShowlevel(), cmdTagger(), cmdTesting(), cmdUseconstraint(), cmdUselevel(), cmdUseLexicon(), cmdVerify(), cmdWeight(), cmdWordgraph(), cmdWriteAnno(), cmdWriteNet(), cmdWriteParses(), cmdWriteWordgraph(), cnBuildEdges(), cnBuildFinal(), cnBuildIter(), cnBuildLv(), cnBuildTriple(), cnBuildUpdateArcs(), cnCompareViolation(), cnOptimizeNet(), cnOptimizeNode(), cnRenew(), cnTag(), cnUndeleteAllLVs(), comApprove(), comCompareAllLvPairs(), comCompareAllLvs(), comCompareLvs(), comCompareNets(), comCompareWithContext(), comCompile(), comInitGrammar(), comMake(), commandEval(), comNew(), compareChunks(), comPrint(), comReturnTypeOfFunction(), comTranslateAbs(), comTranslateArithmetics(), comTranslateConstraint(), comTranslateDistance(), comTranslateEquation(), comTranslateHas(), comTranslateLookup(), comTranslateMatch(), comTranslateMinMax(), comTranslatePrint(), comTranslateTerm(), cvCompare(), cvCompareNatural(), cvContains(), dbAvailable(), dbClose(), dbLoad(), dbLoadAll(), dbLoadEntries(), dbOpen(), dbOpenIndexFile(), evalBinary(), evalConstraint(), evalFormula(), evalInitialize(), evalTerm(), evalValidateEvalMethod(), hkFindNoOfHook(), hkInitialize(), hkValidate(), initChunker(), initFakeChunker(), initRealChunker(), lgAreDeletedNodes(), lgCompatibleSets(), lgComputeNoOfPaths(), lgContains(), lgCopySelection(), lgForbiddenBy(), lgIntersectingSets(), lgIsEndNode(), lgIsStartNode(), lgLexemeInLexemNodeList(), lgMakePath(), lgMember(), lgNewFinal(), lgNewIter(), lgSimultaneous(), lgSpuriousUppercase(), lgSubset(), smNew(), timerSetAlarm(), and timerStopAlarm().

5.1.2.2 #define max(a, b) (a) > (b) ? (a) : (b)

maximum of a or b. Be aware that the expressions a and b might be evaluated twice depending on wether a or b are greater. Definition at line 183 of file cdg.h.

Referenced by cnBuildFinal(), cnPrint(), cnPrintInfo(), comConstraintDepth(), comFormulaDepth(), comFunctionDepth(), comMaxLookupStrings(), comMaxLookupStringsInFormula(), comPredicateDepth(), comTermDepth(), and lgNewIter().

5.1.2.3 #define min(a, b) (a) < (b) ? (a) : (b)

minimum of a or b. Be aware that the expressions a and b might be evaluated twice depending on wether a or b are smaller. Definition at line 190 of file cdg.h.

Referenced by cnPrint(), cnPrintInfo(), comIndent(), comOutdent(), and lgNewIter().

5.1.2.4 #define NULL 0

null, zero, nadda, nothing. NULL has the numeric value 0. Definition at line 199 of file cdg.h.

Referenced by annotation_completion_function(), cdgDeleteComputed(), cdgExecPragmas(), cdgInitialize(), cdgPrintf(), chunkerChunk(), chunkerCloneChunk(), chunkerCommandValidate(), chunkerInitialize(), chunkerNew(), cmdActivate(), cmdAnno2Parse(), cmdAnnos2prolog(), cmdAnnotation(), cmdChunk(), cmdCompareParses(), cmdConstraint(), cmdDeactivate(), cmdDistance(), cmdEdges(), cmdHelp(), cmdHierarchy(), cmdHook(), cmdIncrementalCompletion(), cmdInputwordgraph(), cmdISearch(), cmdLevel(), cmdLexicon(), cmdLoad(), cmdLs(), cmdNet(), cmdNetdelete(), cmdNetsearch(), cmdNewnet(), cmdNonSpecCompatible(), cmdParsedelete(), cmdParses2prolog(), cmdPrintParse(), cmdPrintParses(), cmdRenewnet(), cmdSection(), cmdSet(), cmdShowlevel(), cmdStatus(), cmdUseconstraint(), cmdUselevel(), cmdVerify(), cmdWordgraph(), cmdWriteAnno(), cmdWriteNet(), cmdWriteParses(), cmdWriteWordgraph(), cnBuild(), cnBuildEdges(), cnBuildFinal(), cnBuildInit(), cnBuildIter(), cnBuildLevelValues(), cnBuildLv(), cnBuildNodes(), cnBuildTriple(), cnBuildUpdateArcs(), cnDelete(), cnFindNode(), cnGetGraphemNodeFromArc(), cnInitialize(), cnOptimizeNode(), cnPrint(),

cnPrintEdge(), cnPrintInfo(), cnPrintNode(), cnPrintParses(), cnRenew(), cnTag(), cnUnaryPruning(), comApprove(), comCompareAllLvPairs(), comCompareAllLvs(), comCompareLvs(), comCompareNets(), comCompareWithContext(), comCompile(), comEscapeQuotes(), comFindComparableLv(), comFinitGrammar(), comFree(), comFreeApprover(), comFunctionDepth(), comIndexOfConstraint(), comIndexOfHierarchy(), comInitGrammar(), comInitialize(), comLoad(), comMake(), comMakeInfoNew(), command_completion_function(), commandEval(), commandLoop(), comMaxLookupStringsInTerm(), comNew(), comPredicateDepth(), comReturnTypeOfFunction(), comReturnTypeOfPredicate(), comReturnTypeOfTerm(), comTermDepth(), comTranslateBottomPeek(), comTranslateConstraint(), comTranslateExists(), comTranslateHeight(), comTranslateMinMax(), comTranslatePrint(), comTranslateTopPeek(), comWriteDeclarations(), comWriteHeader(), comWriteInitFunction(), constraint_completion_function(), cvAnalyse(), dbClose(), dbGetEntries(), dbLoad(), dbLoadAll(), dbLoadEntries(), dbOpen(), dbOpenCdgFile(), dbOpenIndexFile(), evalBinary(), evalBinaryConstraint(), evalChunker(), evalConstraint(), evalFormula(), evalHookHandle(), evalInContext(), evalInitialize(), evalUnary(), evalUnaryConstraint(), findChunk(), findGrapheme(), frob_method_completion_function(), getCategories(), getCategory(), getChunks(), getFakeChunks(), getFakeChunksAt(), getHookCmd(), getNextArgument(), getsHookHandle(), glsInteractionHookHandle(), gnClone(), hierarchy_completion_function(), hkInitialize(), hook_completion_function(), hooker_init(), ICinteractionHookHandle(), initHookResult(), interface_completion(), level_completion_function(), levelsort_completion_function(), lexicon_completion_function(), lgAreDeletableNodes(), lgAreDeletedNodes(), lgClone(), lgCompatibleNodes(), lgCompatibleSets(), lgComputeNoOfPaths(), lgCopySelection(), lgCopyTagScores(), lgDelete(), lgDeleteNodes(), lgDistanceOfNodes(), lgInitialize(), lgIntersectingSets(), lgIsEndNode(), lgIsStartNode(), lgLexemeInLexemNodeList(), lgMakePath(), lgMember(), lgMostProbablePath(), lgNew(), lgNewFinal(), lgNewInit(), lgNewIter(), lgPartitions(), lgQueryCat(), lgSimultaneous(), lgSubset(), lgUpdateArcs(), logFlush(), logWriteChar(), make_rl_string(), net_completion_function(), netsearchHookHandle(), newChunk(), newDbEntry(), parse_completion_function(), parseGetCategory(), parseGetGrapheme(), parseGetLevelValue(), parseGetRoots(), partialResultHookHandle(), peekValue(), printChunk(), progressHookHandle(), resetChunker(), resetHookHandle(), scInitialize(), search_method_completion_function(), section_completion_function(), set_completion_function(), setHookCmd(), smDelete(), smGetFlag(), smGetScore(), smSetAllFlags(), smSetFlag(), smSetScore(), tclHookHandle(), terminateChild(), timerFree(), timerSetAlarm(), timerStart(), unlock_tree(), word_completion_function(), and wordgraph_completion_function().

5.1.2.5 #define TRUE 1

this is true. TRUE has the numeric value 1. Definition at line 207 of file cdg.h.

Referenced by bCompare(), chunkerCommandValidate(), cmdActivate(), cmdAnno2Parse(), cmdAnnos2prolog(), cmdAnnotation(), cmdChunk(), cmdCompareParses(), cmdCompile(), cmdConstraint(), cmdDeactivate(), cmdDistance(), cmdEdges(), cmdFrobbing(), cmdHelp(), cmdHierarchy(), cmdHook(), cmdIncrementalCompletion(), cmdInputwordgraph(), cmdISearch(), cmdLevel(), cmdLevelsort(), cmdLexicon(), cmdLicense(), cmdLoad(), cmdLs(), cmdNet(), cmdNetsearch(), cmdNewnet(), cmdNonSpecCompatible(), cmdParsedelete(), cmdParses2prolog(), cmdPrintParse(), cmdPrintParses(), cmdQuit(), cmdRenewnet(), cmdReset(), cmdSection(), cmdShift(), cmdShowlevel(), cmdStatus(), cmdTagger(), cmdTesting(), cmdUseconstraint(), cmdUselevel(), cmdUseLexicon(), cmdVerify(), cmdVersion(), cmdWeight(), cmdWordgraph(), cmdWriteAnno(), cmdWriteNet(), cmdWriteParses(), cmdWriteWordgraph(), cnBuildEdges(), cnBuildIter(), cnBuildNodes(), cnBuildTriple(), cnBuildUpdateArcs(), cnCompareViolation(), cnDeleteAllLVs(), cnOptimizeNet(), cnOptimizeNode(), cnRenew(), cnTag(), cnUnaryPruning(), comApprove(), comCompareAllLvPairs(), comCompareAllLvs(), comCompareLvs(), comCompareNets(), comCompareWithContext(), comCompile(), comInitGrammar(), comMake(), commandEval(), commandLoop(), comNew(), compareChunks(), comPrintln(), comTranslate(), comTranslateAbs(), comTranslateArithmetics(), comTranslateBetween(), comTranslateConstraint(), comTranslateDistance(), comTranslateEquation(), comTranslateGuard(), comTranslateHas(), comTranslateMatch(), comTranslateMinMax(), comTranslatePrint(), comTranslateStartStop(), comTranslateSubsumes(), comTranslateUn-

Equation(), comWriteError(), comWriteWarning(), cvCompare(), cvCompareNatural(), cvContains(), dbAvailable(), dbClose(), dbLoad(), dbLoadAll(), dbLoadEntries(), dbOpen(), dbOpenIndexFile(), evalBinary(), evalBinaryConstraint(), evalConstraint(), evalFormula(), evalInContext(), evalInitialize(), evalUnaryConstraint(), evalValidateEvalMethod(), expire(), hkInitialize(), hkValidate(), initFakeChunker(), initRealChunker(), lgAreDeletableNodes(), lgAreDeletedNodes(), lgCompatibleSets(), lgComputeNoOfPaths(), lgContains(), lgCopySelection(), lgDeleteNode(), lgDeleteNodes(), lgForbiddenBy(), lgIntersectingSets(), lgLexemeInLexemNodeList(), lgMakePath(), lgMayModify(), lgNewFinal(), lgNewIter(), lgRequireLexeme(), lgRequireLexemes(), lgSimultaneous(), lgSpuriousUppercase(), and lgSubset().

5.1.3 Typedef Documentation

5.1.3.1 typedef ChunkStruct* Chunk

type of a chunk pointer Definition at line 237 of file cdg.h.

Referenced by chunkerChunk(), chunkerChunkDelete(), chunkerCloneChunk(), chunkerReplaceGraphemes(), chunkerStringOfChunkType(), cmpChunks(), compareChunks(), countChunks(), embedChunk(), evalChunker(), evalTerm(), findChunk(), getChunks(), getFakeChunksAt(), lgCopyTagScores(), mergeChunk(), newChunk(), postProcessChunks(), and printChunk().

5.1.3.2 typedef ChunkerStruct* Chunker

type of a chunker pointer Definition at line 231 of file cdg.h.

Referenced by chunkerChunk(), chunkerDelete(), chunkerNew(), cmdChunk(), cmpChunks(), cnTag(), embedChunk(), evalChunker(), getChunks(), getFakeChunks(), getFakeChunksAt(), getFakeChunkType(), initChunker(), initFakeChunker(), initRealChunker(), mergeChunk(), parseGetCategory(), parseGetGrapheme(), parseGetLabel(), parseGetLevelValue(), parseGetModifiee(), parseGetRoots(), postProcessChunks(), and resetChunker().

5.1.3.3 typedef struct ChunkerStruct ChunkerStruct

type of a chunker structure Definition at line 228 of file cdg.h.

5.1.3.4 typedef struct ChunkStruct ChunkStruct

type of a chunk structure Definition at line 234 of file cdg.h.

5.1.3.5 typedef GraphemNodeStruct* GraphemNode

type of a graphem node pointer Definition at line 249 of file cdg.h.

Referenced by chunkerChunk(), cmdDistance(), cmpGraphemes(), cnBuildIter(), cnBuildLevelValues(), cnBuildNodes(), cnBuildTriple(), cnBuildUpdateArcs(), cnGetGraphemNodeFromArc(), cnOptimizeNode(), computeNoOfPathsFromStart(), computeNoOfPathsToEnd(), findGrapheme(), getCategories(), getCategory(), getChunks(), getFakeChunksAt(), gnClone(), lgAreDeletableNodes(), lgClone(), lgComputeDistances(), lgComputeNoOfPaths(), lgContains(), lgCopyTagScores(), lgDelete(), lgIsEndNode(), lgIsStartNode(), lgMayModify(), lgMostProbablePath(), lgNewIter(), lgPartitions(), lgQueryCat(), parseGetGrapheme(), and printChunk().

5.1.3.6 typedef struct GraphemNodeStruct GraphemNodeStruct

type of a graphem node structure Definition at line 246 of file cdg.h.

5.1.3.7 typedef LexemNodeStruct* LexemNode

type of a lexem node pointer Definition at line 243 of file cdg.h.

Referenced by cmdDistance(), cnBuildNodes(), cnOptimizeNode(), cnPrintNode(), cnRenew(), cvAnalyse(), evalFormula(), evalTerm(), getCategories(), lgAreDeletableNodes(), lgAreDeletedNodes(), lgClone(), lgCompatibleNodes(), lgCompatibleSets(), lgComputeNoOfPaths(), lgCopySelection(), lgCopyTagScores(), lgDelete(), lgDeleteNode(), lgDeleteNodes(), lgDistanceOfNodes(), lgForbiddenBy(), lgIntersectingSets(), lgIsDeletedNode(), lgLexemeInLexemNodeList(), lgMakePath(), lgMayModify(), lgMember(), lgMostProbablePath(), lgNewIter(), lgOverlap(), lgPartitions(), lgPrint(), lgPrintNode(), lgQueryCat(), lgRequireLexeme(), lgRequireLexemes(), lgSimultaneous(), lgSubset(), lgWidth(), and parseGetCategory().

5.1.3.8 typedef struct LexemNodeStruct LexemNodeStruct

type of a lexem node structure Definition at line 240 of file cdg.h.

5.1.4 Function Documentation

5.1.4.1 void cdgAgInsert (Agenda *a*, double *score*, Pointer *state*) [inline]

helper function for agInsert. This function calls agInsert and emits truncation warnings using the cdgPrintf mechanism. Definition at line 140 of file cdg.c.

References CDG_WARNING, and cdgPrintf().

5.1.4.2 void cdgDeleteComputed (void)

Delete all existing constraint nets, parses and problems.

This should always be used after changing the constraint grammar in any way, because there is no guarantee that the previously computed structures still make sense with the new grammar defnition. A constraint net might contain an LV that used to be allowed, but is now forbidden by a unary hard constraint so that it would not have been built at all under the new regime. Conversely, if the constraint that forbade building a particular LV were turned off, an existing constraint net would become incomplete, and solving it could miss a solution that would be possible under the new conditions. Definition at line 246 of file cdg.c.

References CDG_INFO, cdgExecHook(), cdgNets, cdgParses, cdgPrintf(), cdgProblems, cnDelete(), cnMostRecentlyCreatedNet, ConstraintNet, HOOK_RESET, and NULL.

Referenced by cdgFinalize(), cmdActivate(), cmdDeactivate(), cmdLoad(), cmdReset(), cmdUseconstraint(), and cmdUselevel().

5.1.4.3 void cdgExecPragmas (List *pragmas*)

Execute all #pragma commands seen during last load operation.

The #pragma commands are stored in the input as they are seen during parsing, but they are not executed until after the load. There are two reasons for this:

1. a #pragma can refer to structures that are loaded from the same file as the #pragma – so executing it immediately would be too early.

2. if a load operation fails, it should not affect the state of the program at all. Definition at line 309 of file cdg.c.

References commandEval(), and NULL.

Referenced by cmdLoad().

5.1.4.4 void cdgFinalize (void)

finalize the CDG library. When shutting down the system each module gets the chance to clean up things that might be worth it calling their finalization callback. Be aware that order of finalization might matter. So the hook module gets finalized at last. Definition at line 327 of file cdg.c.

References cdgDeleteComputed(), cdgFreeString(), cdgUser, comFinalize(), dbFinalize(), evalFinalize(), and hkFinalize().

5.1.4.5 void cdgFreeString (String *str*)

wrapper for strDelete This function is our wrapper arround the strDelete() of the blah lib. By default this is a NOP, that is: we don't call strDelete(). You might switch on the call to strDelete() at compile time, if you are brave enuf and wanna help to debug string programming. Definition at line 127 of file cdg.c.

Referenced by cdgFinalize(), chunkerCommandValidate(), cnDelete(), comFree(), comMakeInfoFree(), commandEval(), evalFinalize(), getChunks(), interface_completion(), and resetChunker().

5.1.4.6 void cdgInitialize (void)

system initialization. This is the initialization of the root module that initializes all other modules containing an initialization callback. It is absolutely necessary to call this function before starting to use the CDG library. In general this is done by the cdgp commandline frontend or by the tcl and perl language extension while loading the bindings. When finishing the CDG library the cousin of this function - cdgFinalize() - is to be called. Definition at line 160 of file cdg.c.

References cdgEncodeUmlauts, cdgNets, cdgParses, cdgProblems, cdgTimeLimit, cdgUser, chunkerInitialize(), cnInitialize(), comInitialize(), dbInitialize(), evalInitialize(), hkInitialize(), lgInitialize(), NULL, scInitialize(), and timerInitialize().

5.1.5 Variable Documentation

5.1.5.1 Boolean cdgCtrlCAllowed

allow a ctrl-c event. This flag is used to allow the signal handler to indicate a ctrl-c event. If TRUE the signal handler will set cdgCtrlCTrapped, if FALSE it will not. Definition at line 84 of file cdg.c.

Referenced by cmdAnno2Parse(), cmdAnnotation(), cmdChunk(), cmdCompareParses(), cmdFrobbing(), cmdHierarchy(), cmdIncrementalCompletion(), cmdISearch(), cmdLexicon(), cmdNet(), cmdNetsearch(), cmdNewnet(), cmdPrintParse(), cmdPrintParses(), cmdShift(), cmdWordgraph(), cmdWriteNet(), cmdWriteParses(), cmdWriteWordgraph(), cnBuildFinal(), and comApprove().

5.1.5.2 Boolean cdgCtrlCAllowed = FALSE

allow a ctrl-c event. This flag is used to allow the signal handler to indicate a ctrl-c event. If TRUE the signal handler will set cdgCtrlCTrapped, if FALSE it will not. Definition at line 84 of file cdg.c.

Referenced by cmdAnno2Parse(), cmdAnnotation(), cmdChunk(), cmdCompareParses(), cmdFrobbing(), cmdHierarchy(), cmdIncrementalCompletion(), cmdISearch(), cmdLexicon(), cmdNet(), cmdNetsearch(), cmdNewnet(), cmdPrintParse(), cmdPrintParses(), cmdShift(), cmdWordgraph(), cmdWriteNet(), cmdWriteParses(), cmdWriteWordgraph(), cnBuildFinal(), and comApprove().

5.1.5.3 Boolean cdgCtrlCTrapped

indicator flag set by the signal handler of ctrl-c. If cdgCtrlCAllowed is TRUE and the user presses ctrl-c the flag `cdgCtrlCTrapped` is set to TRUE. It's the responsibility of the current function to re-act to the interruption. Definition at line 76 of file cdg.c.

Referenced by cmdAnno2Parse(), cmdAnnotation(), cmdChunk(), cmdCompareParses(), cmdFrobbing(), cmdHierarchy(), cmdIncrementalCompletion(), cmdISearch(), cmdLexicon(), cmdNet(), cmdNetsearch(), cmdNewnet(), cmdPrintParse(), cmdPrintParses(), cmdShift(), cmdWordgraph(), cmdWriteNet(), cmdWriteParses(), cmdWriteWordgraph(), cnBuild(), cnBuildEdges(), cnBuildFinal(), cnBuildIter(), cnPrint(), comApprove(), comCompareAllLvPairs(), comCompareAllLvs(), and comCompareWithContext().

5.1.5.4 Boolean cdgCtrlCTrapped = FALSE

indicator flag set by the signal handler of ctrl-c. If cdgCtrlCAllowed is TRUE and the user presses ctrl-c the flag `cdgCtrlCTrapped` is set to TRUE. It's the responsibility of the current function to re-act to the interruption. Definition at line 76 of file cdg.c.

Referenced by cmdAnno2Parse(), cmdAnnotation(), cmdChunk(), cmdCompareParses(), cmdFrobbing(), cmdHierarchy(), cmdIncrementalCompletion(), cmdISearch(), cmdLexicon(), cmdNet(), cmdNetsearch(), cmdNewnet(), cmdPrintParse(), cmdPrintParses(), cmdShift(), cmdWordgraph(), cmdWriteNet(), cmdWriteParses(), cmdWriteWordgraph(), cnBuild(), cnBuildEdges(), cnBuildFinal(), cnBuildIter(), cnPrint(), comApprove(), comCompareAllLvPairs(), comCompareAllLvs(), and comCompareWithContext().

5.1.5.5 Boolean cdgEncodeUmlauts

If set, pseudo-umlaut sequences typed into the CDG shell will be turned into real 8bit umlauts: "a ==> ä Definition at line 103 of file cdg.c.

Referenced by cdgInitialize().

5.1.5.6 Boolean cdgEncodeUmlauts = FALSE

If set, pseudo-umlaut sequences typed into the CDG shell will be turned into real 8bit umlauts: "a ==> ä Definition at line 103 of file cdg.c.

Referenced by cdgInitialize().

5.1.5.7 Hashtable cdgNets

all existing ConstraintNets Definition at line 112 of file cdg.c.

Referenced by cdgDeleteComputed(), cdgInitialize(), cmdEdges(), cmdISearch(), cmdNet(), cmdNetdelete(), cmdNetsearch(), cmdNewnet(), cmdStatus(), cmdWriteAnno(), cmdWriteNet(), cnFindNet(), comApprove(), and net_completion_function().

5.1.5.8 Hashtable cdgNets

all existing ConstraintNets Definition at line 112 of file cdg.c.

Referenced by cdgDeleteComputed(), cdgInitialize(), cmdEdges(), cmdISearch(), cmdNet(), cmdNetdelete(), cmdNetsearch(), cmdNewnet(), cmdStatus(), cmdWriteAnno(), cmdWriteNet(), cnFindNet(), comApprove(), and net_completion_function().

5.1.5.9 Hashtable cdgParses

all existing Parses Definition at line 113 of file cdg.c.

Referenced by cdgDeleteComputed(), cdgInitialize(), cmdCompareParses(), cmdParsedelete(), cmdParses2prolog(), cmdPrintParse(), cmdStatus(), and parse_completion_function().

5.1.5.10 Hashtable cdgParses

all existing Parses Definition at line 113 of file cdg.c.

Referenced by cdgDeleteComputed(), cdgInitialize(), cmdCompareParses(), cmdParsedelete(), cmdParses2prolog(), cmdPrintParse(), cmdStatus(), and parse_completion_function().

5.1.5.11 Hashtable cdgProblems

all existing Problems Definition at line 114 of file cdg.c.

Referenced by cdgDeleteComputed(), cdgInitialize(), and cmdNetdelete().

5.1.5.12 Hashtable cdgProblems

all existing Problems Definition at line 114 of file cdg.c.

Referenced by cdgDeleteComputed(), cdgInitialize(), and cmdNetdelete().

5.1.5.13 unsigned long cdgTimeLimit

time limit in milliseconds used by netsearch, frobbing and gls. The value of `cdgTimeLimit` is normaly used to install a timer alarm as in `timerSetAlarm(cdgTimeLimit)`; Definition at line 97 of file cdg.c.

Referenced by cdgInitialize(), cmdFrobbing(), and cmdShift().

5.1.5.14 unsigned long cdgTimeLimit = 0

time limit in milliseconds used by netsearch, frobbing and gls. The value of `cdgTimeLimit` is normaly used to install a timer alarm as in `timerSetAlarm(cdgTimeLimit)`; Definition at line 97 of file cdg.c.

Referenced by cdgInitialize(), cmdFrobbing(), and cmdShift().

5.1.5.15 String cdgUser

user name currently running the CDG system. On startup the user name is stored into this place and propagated to newly computed parses. Definition at line 110 of file cdg.c.

Referenced by cdgFinalize(), and cdgInitialize().

5.1.5.16 String cdgUser = NULL

user name currently running the CDG system. On startup the user name is stored into this place and propagated to newly computed parses. Definition at line 110 of file cdg.c.

Referenced by cdgFinalize(), and cdgInitialize().

5.1.5.17 Boolean cdgXCDG

xcdg indicator flag. If TRUE we're running under XCDG. Definition at line 90 of file cdg.c.

Referenced by cnBuildEdges(), and getNextArgument().

5.1.5.18 Boolean cdgXCDG = FALSE

xcdg indicator flag. If TRUE we're running under XCDG. Definition at line 90 of file cdg.c.

Referenced by cnBuildEdges(), and getNextArgument().

5.2 Cdgdb - Get lexical entries out of a berkeley database

5.2.1 Detailed Description

Author:
Othello Maurer

Date:
unknown

This file provides an interface for retrieving lexical entries out of a berkeley database. The database file contains only references to an underlying cdg file which actually holds the entries. For loading the requested lexical entries, a temp file will be created out of the cdg file, containing only these entries. This file will then be parsed with **inpuLoad()** into the memory.

Data Structures

- struct entryStruct

Typedefs

- typedef entryStruct * dbEntry

Functions

- Boolean dbAvailable (void)
- Boolean dbClose (void)
- void dbFinalize (void)
- List dbGetEntries (String word)
- void dbInitialize (void)
- Boolean dbLoad (String key)
- Boolean dbLoadAll (List forms)
- Boolean dbLoadEntries (List entries)
- Boolean dbOpen (String name)
- Boolean dbOpenCdgFile (String filename)
- Boolean dbOpenIndexFile (String filename)
- dbEntry newDbEntry ()

Variables

- FILE * cdgstream
- DB * database
- time_t dbAge
- String dbFileName
- String dbIndexName
- Hashtable done = NULL
- String tmpFilename = NULL

5.2.2 Typedef Documentation

5.2.2.1 typedef entryStruct* dbEntry

a pointer to the entryStruct Definition at line 85 of file cdgdb.c.

Referenced by dbGetEntries(), dbLoadEntries(), and newDbEntry().

5.2.3 Function Documentation

5.2.3.1 Boolean dbAvailable (void)

checks if there is a database handle available.

Returns:
TRUE if there is a database opened, else FALSE

Definition at line 228 of file cdgdb.c.

References CDG_WARNING, cdgPrintf(), database, dbAge, dbClose(), dbFileName, dbIndexName, dbOpenCdgFile(), dbOpenIndexFile(), FALSE, and TRUE.

Referenced by cmdAnno2Parse(), dbFinalize(), dbLoad(), and dbLoadAll().

5.2.3.2 Boolean dbClose (void)

close the database. writes database to disk and closes it.

Returns:
TRUE if success, FALSE otherwise

Definition at line 160 of file cdgdb.c.

References CDG_ERROR, cdgPrintf(), database, FALSE, NULL, and TRUE.

Referenced by cmdCloseDB(), dbAvailable(), and dbFinalize().

5.2.3.3 void dbFinalize (void)

finalize close the database, delete **done** hash, remove temporary file Definition at line 457 of file cdgdb.c.

References dbAvailable(), dbClose(), done, and tmpFilename.

Referenced by cdgFinalize().

5.2.3.4 List dbGetEntries (String *word*)

gets lexical entries from the database. gets a result list of LexiconItem matching the given word (the key) from the database. This function succeeds only once for a given word form.

Parameters:
word the word which is the key

Returns:
a list of dbEntry struct, all of them having the same key and NULL if there was an Error

Definition at line 274 of file cdgdb.c.

References CDG_ERROR, cdgPrintf(), database, dbEntry, entryStruct::key, newDbEntry(), NULL, entryStruct::oBegin, and entryStruct::oEnd.

Referenced by dbLoad(), and dbLoadAll().

5.2.3.5 void dbInitialize (void)

Initialize Definition at line 447 of file cdgdb.c.

References done.

Referenced by cdgInitialize().

5.2.3.6 Boolean dbLoad (String *key*)

wrapper for dbLoadEntries(). generates a temp file which holds lexical entries and parses them into the memory

Parameters:

key the key of the lex entries which have to be parsed

Returns:

TRUE if success, else FALSE

Definition at line 385 of file cdgdb.c.

References CDG_INFO, cdgPrintf(), dbAvailable(), dbGetEntries(), dbLoadEntries(), done, FALSE, NULL, and TRUE.

5.2.3.7 Boolean dbLoadAll (List *forms*)

Another wrapper for dbLoadEntries().

It loads all known lexicon items for words in the list FORMS. This has exactly the same effect as calling dbLoad() repeatedly, but is faster because there will be only one file system operation instead of n. Definition at line 415 of file cdgdb.c.

References CDG_INFO, CDG_PROGRESS, cdgPrintf(), dbAvailable(), dbGetEntries(), dbLoadEntries(), done, FALSE, NULL, and TRUE.

Referenced by cmdAnno2Parse().

5.2.3.8 Boolean dbLoadEntries (List *entries*)

loads lexical entries into the memory. generates a temp file which holds lexical entries and parses them into the memory

Parameters:

entries a list of dbEntry structs you want to parse

Returns:

True if success, else FALSE

Definition at line 333 of file cdgdb.c.

References CDG_ERROR, CDG_INFO, cdgPrintf(), cdgstream, dbEntry, FALSE, hkVerbosity, NULL, entryStruct::oBegin, entryStruct::oEnd, tmpFilename, and TRUE.

Referenced by dbLoad(), and dbLoadAll().

5.2.3.9 Boolean dbOpen (String *name*)

Open the data base.

NAME is the base name of the cdg and the index file. Definition at line 182 of file cdgdb.c.

References CDG_ERROR, cdgPrintf(), dbFileName, dbIndexName, dbOpenCdgFile(), dbOpenIndexFile(), FALSE, NULL, and TRUE.

Referenced by cmdUseLexicon().

5.2.3.10 Boolean dbOpenCdgFile (String *filename*)

open the cdg file. opens the cdg file, which the database is indexing you have to ensure that it is the right one, otherwise you will get crap

Parameters:
filename the name of the cdg file

Returns:
TRUE if success, else FALSE

Definition at line 139 of file cdgdb.c.

References cdgstream, database, dbAge, dbFileName, and NULL.

Referenced by dbAvailable(), and dbOpen().

5.2.3.11 Boolean dbOpenIndexFile (String *filename*)

opens a database. this function opens a database, specified by the parameter 'filename' and stores the handle in the static variable 'database'. If there is no database file with this filename, a new database is created.

Parameters:
filename the filename of the database file

Returns:
TRUE if success, FALSE otherwise

Definition at line 100 of file cdgdb.c.

References CDG_ERROR, cdgPrintf(), database, dbIndexName, FALSE, NULL, and TRUE.

Referenced by dbAvailable(), and dbOpen().

5.2.3.12 dbEntry newDbEntry ()

constructor for dbEntry objects.

Returns:
a new dbEntry

Definition at line 257 of file cdgdb.c.

References dbEntry, entryStruct::key, NULL, entryStruct::oBegin, and entryStruct::oEnd.

Referenced by dbGetEntries().

5.2.4 Variable Documentation

5.2.4.1 FILE* cdgstream [static]

the underlying cdg file. This is actually the file, where the lexical entries are stored in. Definition at line 56 of file cdgdb.c.

Referenced by dbLoadEntries(), and dbOpenCdgFile().

5.2.4.2 DB* database [static]

database handle. The handle to the database struct Definition at line 52 of file cdgdb.c.

Referenced by dbAvailable(), dbClose(), dbGetEntries(), dbOpenCdgFile(), and dbOpenIndexFile().

5.2.4.3 time_t dbAge [static]

age of that file at the time of the last opening Definition at line 65 of file cdgdb.c.

Referenced by dbAvailable(), and dbOpenCdgFile().

5.2.4.4 String dbFileName [static]

file name of the file with CDG input in it Definition at line 59 of file cdgdb.c.

Referenced by dbAvailable(), dbOpen(), and dbOpenCdgFile().

5.2.4.5 String dbIndexName [static]

file name of the index Definition at line 62 of file cdgdb.c.

Referenced by dbAvailable(), dbOpen(), and dbOpenIndexFile().

5.2.4.6 Hashtable done = NULL [static]

table of words already loaded. Holds the word which are yet retrieved from the database, so that the database won't be questioned for them Definition at line 73 of file cdgdb.c.

Referenced by dbFinalize(), dbInitialize(), dbLoad(), and dbLoadAll().

5.2.4.7 String tmpFilename = NULL [static]

the filename of the temporary file. This temporary file will contain a set of lexical entries that can then be parsed into the memory. Definition at line 69 of file cdgdb.c.

Referenced by dbFinalize(), and dbLoadEntries().

5.3 Chunker - Interface to a Chunking Parser

5.3.1 Detailed Description

Author:
Michael Daum (see also AUTHORS and THANKS for more)

Date:
2002-09-09

Id
chunker.c,v 1.41 2004/09/01 13:42:31 micha Exp

This module offers an interface for an external chunker.

Id
chunker.h,v 1.12 2004/09/01 13:44:12 micha Exp

Data Structures

- struct ChunkerStruct
- struct ChunkStruct

Enumerations

- enum ChunkerMode { DefaultChunker, FakeChunker, RealChunker, EvalChunker }
- enum ChunkType {
  NChunk, PChunk, VChunk, NoChunk,
  UnknownChunk }

Functions

- List chunkerChunk (Chunker chunker)
- void chunkerChunkDelete (Chunk chunk)
- ChunkType chunkerChunkTypeOfString (String tag)
- Chunk chunkerCloneChunk (Chunk chunk)
- Boolean chunkerCommandValidate (String name, String value, String *var)
- void chunkerDelete (Chunker chunker)
- void chunkerFinalize (void)
- void chunkerInitialize (void)
- Chunker chunkerNew (ChunkerMode mode, LexemGraph lg)
- void chunkerPrintChunks (unsigned long mode, List chunks)
- void chunkerReplaceGraphemes (Chunk chunk, LexemGraph lg)
- String chunkerStringOfChunkType (Chunk chunk)
- Boolean cmpArcs (Arc arc1, Arc arc2)
- Boolean cmpChunks (Chunk c1, Chunk c2, Chunker chunker)
- Boolean cmpGraphemes (GraphemNode g1, GraphemNode g2)
- Boolean compareChunks (Chunk c1, Chunk c2)
- int countChunks (List chunks)

- Chunk embedChunk (Chunker chunker, Chunk target, Chunk source)
- int evalChunker (Chunker chunker, List annoChunks)
- Chunk findChunk (List chunks, int from, int to)
- GraphemNode findGrapheme (LexemGraph lg, GraphemNode gn)
- List getCategories (GraphemNode gn)
- String getCategory (GraphemNode gn)
- List getChunks (Chunker chunker)
- List getFakeChunks (Chunker chunker)
- List getFakeChunksAt (Chunker chunker, Chunk parent, int index)
- ChunkType getFakeChunkType (Chunker chunker, int index)
- Boolean initChunker (Chunker chunker)
- Boolean initFakeChunker (Chunker chunker)
- Boolean initRealChunker (Chunker chunker)
- Chunk mergeChunk (Chunker chunker, Chunk target, Chunk source)
- Chunk newChunk (ChunkType type)
- String parseGetCategory (Chunker chunker, int index)
- GraphemNode parseGetGrapheme (Chunker chunker, int index)
- String parseGetLabel (Chunker chunker, int index)
- LevelValue parseGetLevelValue (Chunker chunker, int index)
- int parseGetModifiee (Chunker chunker, int index)
- List parseGetRoots (Chunker chunker)
- void postProcessChunks (Chunker chunker, List chunks)
- void printChunk (unsigned long mode, Chunk chunk)
- void resetChunker (Chunker chunker)
- int terminateChild (pid_t pid)

Variables

- char ** chunkerArgs = NULL
- String chunkerCommand = NULL
- ChunkerMode chunkerMode = RealChunker
- Boolean chunkerUseChunker = FALSE

5.3.2 Enumeration Type Documentation

5.3.2.1 enum ChunkerMode

different modes the chunker can operate in.

Enumeration values:

DefaultChunker the globally set chunker type: one of the below

FakeChunker read chunks from the annotation

RealChunker call the real chunker

EvalChunker call the real chunker and compare it to the fake chunker

Definition at line 34 of file chunker.h.

5.3.2.2 enum ChunkType

chunk types.

Enumeration values:

NChunk a chunk of a nominal clause

PChunk a chunk of a prepositional clause

VChunk a chunk of a verbal clause

NoChunk things which never go into a chunk

UnknownChunk fallback

Definition at line 44 of file chunker.h.

Referenced by chunkerChunkTypeOfString(), and getFakeChunkType().

5.3.3 Function Documentation

5.3.3.1 List chunkerChunk (Chunker *chunker*)

compute the chunks.

Parameters:

chunker the current chunker

Returns:

a list of chunks or NULL on failure.

The returned list is owned by the chunker and thus needs no extra deallocation besides chunker deletion. The list of computed chunks is then used to assert the chunking information into the LexemGraph lg. Definition at line 1553 of file chunker.c.

References CDG_ERROR, CDG_INFO, cdgPrintf(), GraphemNodeStruct::chunk, Chunk, Chunker, chunkerChunkDelete(), chunkerCloneChunk(), chunkerReplaceGraphemes(), LexemGraphStruct::chunks, ChunkerStruct::chunks, evalChunker(), EvalChunker, FakeChunker, getChunks(), getFakeChunks(), GraphemNode, ChunkerStruct::lg, ChunkerStruct::mode, ChunkStruct::nodes, NULL, RealChunker, and ChunkStruct::subChunks.

Referenced by cmdChunk(), and cnTag().

5.3.3.2 void chunkerChunkDelete (Chunk *chunk*)

chunkerChunkDelete: destruct a chunk and all its subchunks.

parameters: chunk = a chunk to be deallocated Definition at line 504 of file chunker.c.

References Chunk, chunkerChunkDelete(), ChunkStruct::nodes, and ChunkStruct::subChunks.

Referenced by chunkerChunk(), chunkerChunkDelete(), getFakeChunksAt(), lgDelete(), and resetChunker().

5.3.3.3 ChunkType chunkerChunkTypeOfString (String *tag*)

return the string representation of a chunk type. Definition at line 1513 of file chunker.c.

References ChunkType, NChunk, NoChunk, PChunk, and VChunk.

Referenced by getChunks().

5.3.3.4 Chunk chunkerCloneChunk (Chunk *chunk*)

chunkerCloneChunk: construct a copy of a given chunk including clones of subChunks.

parameters: chunk = the original returns: the copy. Definition at line 477 of file chunker.c.

References Chunk, chunkerCloneChunk(), ChunkStruct::from, ChunkStruct::head, newChunk(), ChunkStruct::nodes, NULL, ChunkStruct::parent, ChunkStruct::subChunks, ChunkStruct::to, and ChunkStruct::type.

Referenced by chunkerChunk(), chunkerCloneChunk(), lgCopyTagScores(), and mergeChunk().

5.3.3.5 Boolean chunkerCommandValidate (String *name*, String *value*, String * *var*)

validation command for chunkerCommand.

Parameters:

name name of the variable (chunkerCommand in our case)

value the value to be set

var the address of a possibly converted value

Returns:

TRUE on success

Basically the chunkerCommand value is converted into chunkerArgs which are then used when actually forking the chunker command.

See also:

chunkerInitialize, chunkerArgs

Definition at line 1803 of file chunker.c.

References CDG_ERROR, cdgFreeString(), cdgPrintf(), chunkerArgs, FALSE, NULL, and TRUE.

Referenced by chunkerInitialize().

5.3.3.6 void chunkerDelete (Chunker *chunker*)

chunkerDelete: destroy the chunker representation.

parameters: chunker = the object to be destructed Definition at line 439 of file chunker.c.

References Chunker, and resetChunker().

Referenced by cmdChunk(), and cnTag().

5.3.3.7 void chunkerFinalize (void)

finalize the chunker module.

This is called by cdgFinalize. (No good module without a finalizer and a initializer.)

See also:
chunkerInitialize

Definition at line 1930 of file chunker.c.

5.3.3.8 void chunkerInitialize (void)

initialize the chunker module.

This is called only once by cdgInitialize when the application starts up.

See also:
chunkerFinalize

Definition at line 1908 of file chunker.c.

References chunkerCommand, chunkerCommandValidate(), chunkerMode, chunkerUseChunker, EvalChunker, FakeChunker, NULL, and RealChunker.

Referenced by cdgInitialize().

5.3.3.9 Chunker chunkerNew (ChunkerMode *mode*, LexemGraph *lg*)

construct a new chunker.

Parameters:
mode one of the defined ChunkerMode

lg data from which we're going to initialize

Returns:
a new chunker

In case of a RealChunker a child process is forked in the background specified by the chunkerCommand. This function might return NULL when chunking is switched off, no chunkerCommand is defined or the initialization of the chunker object fails.

See also:
initChunker, initRealChunker, initFakeChunker

Definition at line 190 of file chunker.c.

References ChunkerStruct::args, CDG_ERROR, cdgPrintf(), Chunker, chunkerArgs, chunkerCommand, chunkerMode, chunkerUseChunker, ChunkerStruct::chunks, DefaultChunker, FakeChunker, FALSE, initChunker(), ChunkerStruct::lg, ChunkerStruct::mode, ChunkerStruct::nrLevels, ChunkerStruct::nrWords, NULL, ChunkerStruct::parse, and ChunkerStruct::pid.

Referenced by cmdChunk(), and cnTag().

5.3.3.10 void chunkerPrintChunks (unsigned long *mode*, List *chunks*)

print the chunks of a lattice.

Parameters:
mode print mode, e.g. CDG_INFO

chunks the list of chunks to be printed

Definition at line 1495 of file chunker.c.

References cdgPrintf(), and printChunk().

Referenced by cmdChunk(), cnPrint(), cnTag(), and lgPrint().

5.3.3.11 void chunkerReplaceGraphemes (Chunk *chunk*, LexemGraph *lg*)

chunkerReplaceGraphemes: replace all grapheme references in a chunk with those given in a lexemgraph.

parameters: chunk = the structure using the arcs lg = the lexemgraph using equivalent arcs Definition at line 1771 of file chunker.c.

References Chunk, findGrapheme(), ChunkStruct::from, ChunkStruct::head, ChunkStruct::nodes, ChunkStruct::subChunks, and ChunkStruct::to.

Referenced by chunkerChunk(), and lgCopyTagScores().

5.3.3.12 String chunkerStringOfChunkType (Chunk *chunk*)

return the string representation of a chunk type. Definition at line 1530 of file chunker.c.

References Chunk, NChunk, PChunk, ChunkStruct::type, and VChunk.

Referenced by embedChunk(), evalTerm(), getChunks(), getFakeChunksAt(), mergeChunk(), postProcessChunks(), and printChunk().

5.3.3.13 Boolean cmpArcs (Arc *arc1*, Arc *arc2*) [static]

cmpArcs: return true if arc1 starts before arc2 Definition at line 525 of file chunker.c.

Referenced by embedChunk().

5.3.3.14 Boolean cmpChunks (Chunk *c1*, Chunk *c2*, Chunker *chunker*) [static]

cmpChunks: return true if c1 starts before c2. Definition at line 533 of file chunker.c.

References GraphemNodeStruct::arc, Chunk, Chunker, and ChunkStruct::from.

Referenced by embedChunk(), getChunks(), getFakeChunks(), getFakeChunksAt(), and mergeChunk().

5.3.3.15 Boolean cmpGraphemes (GraphemNode *g1*, GraphemNode *g2*) [static]

cmpGraphemes: return true if g1 start before g2 Definition at line 517 of file chunker.c.

References GraphemNodeStruct::arc, and GraphemNode.

Referenced by mergeChunk().

5.3.3.16 Boolean compareChunks (Chunk *c1*, Chunk *c2*) [static]

are two chunks isomorph.

Parameters:

c1 the one chunk

c2 the other chunk

Returns:

TRUE if the two chunks are equal, else FALSE

This is again a recursion where all sub chunks must match aswell. Definition at line 1621 of file chunker.c.

References GraphemNodeStruct::arc, Chunk, FALSE, ChunkStruct::from, ChunkStruct::subChunks, ChunkStruct::to, TRUE, and ChunkStruct::type.

Referenced by evalChunker().

5.3.3.17 int countChunks (List *chunks*) [static]

count the number of chunks.

Parameters:

chunks list of chunks to be counted

Returns:

amount of chunks

This not only counts the list length but also all sub chunks. Definition at line 1331 of file chunker.c.

References Chunk, NChunk, PChunk, ChunkStruct::subChunks, ChunkStruct::type, and VChunk.

Referenced by evalChunker().

5.3.3.18 Chunk embedChunk (Chunker *chunker*, Chunk *target*, Chunk *source*) [static]

embedChunk: embed chunk as a subchunk into the target chunk

parameters target = the resulting chunk source = the chunk to be embedded returns: the target chunk. Definition at line 846 of file chunker.c.

References GraphemNodeStruct::arc, CDG_DEBUG, cdgPrintf(), Chunk, Chunker, chunkerStringOfChunkType(), cmpArcs(), cmpChunks(), ChunkStruct::from, ChunkStruct::nodes, ChunkStruct::subChunks, and ChunkStruct::to.

Referenced by getFakeChunksAt().

5.3.3.19 int evalChunker (Chunker *chunker*, List *annoChunks*) [static]

evaluate computed agains annotated chunks.

Parameters:

chunker the current chunker

annoChunks the list of chunks extracted from the annotation

Returns:

the number of errors

Definition at line 1655 of file chunker.c.

References GraphemNodeStruct::arc, CDG_INFO, CDG_WARNING, cdgPrintf(), Chunk, Chunker, ChunkerStruct::chunks, compareChunks(), countChunks(), findChunk(), ChunkStruct::from, NChunk, NoChunk, NULL, PChunk, printChunk(), ChunkStruct::to, ChunkStruct::type, and VChunk.

Referenced by chunkerChunk().

5.3.3.20 Chunk findChunk (List *chunks*, int *from*, int *to*) [static]

search the chunk that spans over the given indices.

Parameters:

chunks a list of chunks

from the starting point of the span

to the ending point of the span

Returns:

the found Chunk or NULL if the specified span has not been chunked so far

This is a recursive function:

- returns NULL if chunks is empty
- returns NULL if <from-to> is not spanned by any chunk
- returns chunk X if it spans exactly <from-to>
- if a chunk X spans more than <from-to>
  - return X if there's no exaclty spanning sub chunk Y
  - or the found sub chunk Y inside X

Definition at line 1366 of file chunker.c.

References GraphemNodeStruct::arc, CDG_DEBUG, cdgPrintf(), Chunk, ChunkStruct::from, NULL, printChunk(), ChunkStruct::subChunks, and ChunkStruct::to.

Referenced by evalChunker(), and getChunks().

5.3.3.21 GraphemNode findGrapheme (LexemGraph *lg*, GraphemNode *old*) [static]

find an equivalent grapheme in a given lexemgraph.

parameters: lg = the lexemgraph arc = the arc (possibly not used in the lexemgraph) returns: an equivalent arc. Definition at line 1745 of file chunker.c.

References GraphemNodeStruct::arc, GraphemNode, LexemGraphStruct::graphemnodes, and NULL.

Referenced by chunkerReplaceGraphemes().

5.3.3.22 List getCategories (GraphemNode *gn*) [static]

getCategories: get all POS-tags of undeleted lexem nodes

parameter: gn = a lexem node returns: a list of POS tags. Definition at line 646 of file chunker.c.

References CDG_DEBUG, cdgPrintf(), GraphemNode, LexemGraphStruct::isDeletedNode, LexemNodeStruct::lexem, GraphemNodeStruct::lexemes, GraphemNodeStruct::lexemgraph, LexemNode, LexemNodeStruct::no, NULL, and LexemNodeStruct::tagscore.

Referenced by getCategory(), and printChunk().

5.3.3.23 String getCategory (GraphemNode *gn*) [static]

getCategory: get one POS-tag, warn if there are more than one

parameter: gn = a grapheme returns: the first POS-tag available. Definition at line 614 of file chunker.c.

References CDG_WARNING, cdgPrintf(), getCategories(), GraphemNode, and NULL.

Referenced by getChunks(), postProcessChunks(), and printChunk().

5.3.3.24 List getChunks (Chunker *chunker*) [static]

this is the entry function to the real chunker.

Parameters:
chunker the current chunker to be used

Returns:
a list of chunks

Writes to the chunker, reads from the chunker and builds a list of chunks. Definition at line 1152 of file chunker.c.

References GraphemNodeStruct::arc, CDG_DEBUG, CDG_ERROR, CDG_WARNING, cdgFreeString(), cdgPrintf(), Chunk, Chunker, chunkerChunkTypeOfString(), chunkerStringOfChunkType(), cmpChunks(), findChunk(), ChunkStruct::from, getCategory(), GraphemNode, LexemGraphStruct::graphemnodes, ChunkStruct::head, ChunkerStruct::lg, newChunk(), ChunkStruct::nodes, NULL, ChunkerStruct::pipe1, ChunkerStruct::pipe2, ChunkStruct::subChunks, and ChunkStruct::to.

Referenced by chunkerChunk().

5.3.3.25 List getFakeChunks (Chunker *chunker*) [static]

this is the entry function to the fake chunker.

Parameters:
chunker the current chunker to be used

Returns:
a list of chunks

Definition at line 1120 of file chunker.c.

References Chunker, cmpChunks(), getFakeChunksAt(), NULL, parseGetRoots(), and postProcessChunks().

Referenced by chunkerChunk().

5.3.3.26 List getFakeChunksAt (Chunker *chunker*, Chunk *parent*, int *index*) [static]

get the chunks under the given root node.

Parameters:

chunker the current chunker

parent dominating chunk

index index of the root node in the dependency tree

Definition at line 882 of file chunker.c.

References GraphemNodeStruct::arc, CDG_DEBUG, cdgPrintf(), Chunk, Chunker, chunkerChunkDelete(), chunkerStringOfChunkType(), cmpChunks(), embedChunk(), ChunkStruct::from, getFakeChunkType(), GraphemNode, ChunkStruct::head, ChunkerStruct::mainlevel, mergeChunk(), NChunk, newChunk(), ChunkStruct::nodes, NULL, ChunkStruct::parent, ChunkerStruct::parse, parseGetGrapheme(), parseGetLabel(), PChunk, ChunkStruct::to, ChunkStruct::type, UnknownChunk, and VChunk.

Referenced by getFakeChunks().

5.3.3.27 ChunkType getFakeChunkType (Chunker *chunker*, int *index*) [static]

getFakeChunkType Definition at line 741 of file chunker.c.

References Chunker, ChunkType, NChunk, NoChunk, parseGetCategory(), PChunk, UnknownChunk, and VChunk.

Referenced by getFakeChunksAt().

5.3.3.28 Boolean initChunker (Chunker *chunker*) [static]

initialize the chunker with the given data.

Parameters:

chunker the current chunker

Returns:

true on success.

This is called from chunkerChunk and from chunkerNew. It calls initFakeChunker or initRealChunker depending on the chunker mode. Definition at line 240 of file chunker.c.

References CDG_ERROR, cdgPrintf(), Chunker, EvalChunker, FakeChunker, FALSE, initFakeChunker(), initRealChunker(), ChunkerStruct::mode, and RealChunker.

Referenced by chunkerNew().

5.3.3.29 Boolean initFakeChunker (Chunker *chunker*) [static]

initialize a fake chunker with the given data.

Parameters:

chunker the current chunker

Returns:
true on success.

This function is called by initChunker() whenever the given Chunker is in mode FakeChunker. In order to work properly the contained Lattice within the LexemGraph lg must have a corresponding Annotation from which the chunks can be faked.

See also:
also initChunker, initFakeChunker, initRealChunker, chunkerChunk.

Definition at line 272 of file chunker.c.

References CDG_ERROR, cdgPrintf(), Chunker, FALSE, LexemGraphStruct::lattice, ChunkerStruct::lg, ChunkerStruct::mainlevel, ChunkerStruct::nrLevels, ChunkerStruct::nrWords, ChunkerStruct::parse, resetChunker(), and TRUE.

Referenced by initChunker().

5.3.3.30 Boolean initRealChunker (Chunker *chunker*) [static]

initialize a real chunker with the given data.

Parameters:
chunker the current chunker

Returns:
true on success.

This function is called from initChunker during the initialization of the chunker, that is just before it starts chunking in chunkerChunk.

See also:
also initChunker, initFakeChunker, initRealChunker, chunkerChunk.

Definition at line 332 of file chunker.c.

References ChunkerStruct::args, CDG_DEBUG, CDG_ERROR, cdgPrintf(), Chunker, FALSE, ChunkerStruct::mainlevel, ChunkerStruct::pid, ChunkerStruct::pipe1, ChunkerStruct::pipe2, and TRUE.

Referenced by initChunker().

5.3.3.31 Chunk mergeChunk (Chunker *chunker*, Chunk *target*, Chunk *source*) [static]

mergeChunk: add the source to the target chunk. the target chunk spans the words of both chunks.

parameters: chunker = the current chunker target = the resulting chunk source = the chunk to be added to the target

returns: the target chunk. Definition at line 805 of file chunker.c.

References GraphemNodeStruct::arc, CDG_DEBUG, cdgPrintf(), Chunk, Chunker, chunkerCloneChunk(), chunkerStringOfChunkType(), cmpChunks(), cmpGraphemes(), ChunkStruct::from, ChunkStruct::nodes, ChunkStruct::subChunks, and ChunkStruct::to.

Referenced by getFakeChunksAt().

5.3.3.32 Chunk newChunk (ChunkType *type*) [static]

construct a new chunk and initialize it.

Parameters:
type one of the ChunkTypes NChunk, PChunk, ...

Returns:
a new empty Chunk.

Definition at line 454 of file chunker.c.

References Chunk, ChunkStruct::from, ChunkStruct::head, ChunkStruct::nodes, NULL, ChunkStruct::parent, ChunkStruct::subChunks, ChunkStruct::to, and ChunkStruct::type.

Referenced by chunkerCloneChunk(), getChunks(), and getFakeChunksAt().

5.3.3.33 String parseGetCategory (Chunker *chunker*, int *index*) [static]

parseGetCategory: get the POS-tag of a given word index

parameters: chunker = the current chunker index = index of a word in the parse.

returns: the POS-tag string or NULL if not defined Definition at line 694 of file chunker.c.

References Chunker, LexemNodeStruct::lexem, LexemNode, NULL, and parseGetLevelValue().

Referenced by getFakeChunkType().

5.3.3.34 GraphemNode parseGetGrapheme (Chunker *chunker*, int *index*) [static]

parseGetGrapheme: get the grapheme node of a given word index

parameters: chunker = the current chunker index = index of a word in the parse.

returns: the arc. Definition at line 720 of file chunker.c.

References CDG_ERROR, cdgPrintf(), Chunker, GraphemNode, NULL, and parseGetLevelValue().

Referenced by getFakeChunksAt().

5.3.3.35 String parseGetLabel (Chunker *chunker*, int *index*) [static]

parseGetLabel: get the label of the dependency of a word (on the main level)

parameters: chunker = the current chunker index = index of a word in the parse returns: the label of that dependency Definition at line 585 of file chunker.c.

References Chunker, ChunkerStruct::mainlevel, ChunkerStruct::nrLevels, and ChunkerStruct::parse.

Referenced by getFakeChunksAt().

5.3.3.36 LevelValue parseGetLevelValue (Chunker *chunker*, int *index*) [static]

parseGetLevelValue: get the dependency arc of a word.

parameters: chunker = the current chunker index = index of a word in the parse.

returns: the level value of this word Definition at line 600 of file chunker.c.

References Chunker, ChunkerStruct::mainlevel, NULL, and ChunkerStruct::parse.

Referenced by parseGetCategory(), and parseGetGrapheme().

5.3.3.37 int parseGetModifiee (Chunker *chunker*, int *index*) [static]

parseGetModifiee: get the word this one is modifying (on the main level)

parameters: chunker = the current chunker index = the modifier index in the word vector of the current parse returns: the modifiee index Definition at line 571 of file chunker.c.

References Chunker, ChunkerStruct::mainlevel, ChunkerStruct::nrLevels, and ChunkerStruct::parse.

Referenced by parseGetRoots().

5.3.3.38 List parseGetRoots (Chunker *chunker*) [static]

parseGetRoots: get all unbound words (on the main level)

parameters: chunker = the current chunker returns: a list of word indices or NULL if there are no root bindings (?)

Note: you become the owner of the returned list container, so deallocate it after you've consumed the result. Definition at line 548 of file chunker.c.

References Chunker, ChunkerStruct::nrWords, NULL, and parseGetModifiee().

Referenced by getFakeChunks().

5.3.3.39 void postProcessChunks (Chunker *chunker*, List *inputList*) [static]

postProcessChunks: get rid of unwanted chunks.

parameters: inputList = items to be filtered Definition at line 1091 of file chunker.c.

References GraphemNodeStruct::arc, CDG_DEBUG, cdgPrintf(), Chunk, Chunker, chunkerStringOfChunkType(), ChunkStruct::from, getCategory(), NoChunk, ChunkStruct::to, ChunkStruct::type, and UnknownChunk.

Referenced by getFakeChunks().

5.3.3.40 void printChunk (unsigned long *mode*, Chunk *chunk*) [static]

printChunk: print a single chunk and all its subchunks

parameters: mode = print mode, e.g. CDG_INFO chunk = the chunk to be printed Definition at line 1423 of file chunker.c.

References GraphemNodeStruct::arc, cdgPrintf(), Chunk, chunkerStringOfChunkType(), getCategories(), getCategory(), GraphemNode, ChunkStruct::head, NoChunk, ChunkStruct::nodes, NULL, ChunkStruct::subChunks, ChunkStruct::to, and ChunkStruct::type.

Referenced by chunkerPrintChunks(), evalChunker(), and findChunk().

5.3.3.41 void resetChunker (Chunker *chunker*) [static]

resetChunker: set the chunker in a state of innocence.

parameters: chunker = the object of desire Definition at line 404 of file chunker.c.

References ChunkerStruct::args, cdgFreeString(), Chunker, chunkerChunkDelete(), ChunkerStruct::chunks, ChunkerStruct::lg, ChunkerStruct::nrLevels, ChunkerStruct::nrWords, NULL, ChunkerStruct::parse, ChunkerStruct::pid, ChunkerStruct::pipe1, ChunkerStruct::pipe2, and terminateChild().

Referenced by chunkerDelete(), and initFakeChunker().

5.3.3.42 int terminateChild (pid_t *pid*)

terminateChild

This function waits for child with the specified pid to terminate.

Return values:

-1 error 0 child died already 1 child died after SIGTERM 2 child died after SIGKILL Definition at line 137 of file chunker.c.

References CDG_ERROR, CDG_WARNING, cdgPrintf(), and NULL.

Referenced by resetChunker().

5.3.4 Variable Documentation

5.3.4.1 char** chunkerArgs = NULL [static]

NULL terminated array of command arguments used for real chunking Definition at line 81 of file chunker.c.

Referenced by chunkerCommandValidate(), and chunkerNew().

5.3.4.2 String chunkerCommand = NULL [static]

string representation of the current command used for real chunking Definition at line 78 of file chunker.c.

Referenced by chunkerInitialize(), and chunkerNew().

5.3.4.3 ChunkerMode chunkerMode = RealChunker [static]

set the default chunker mode,

See also:
DefaultChunker

Definition at line 75 of file chunker.c.

Referenced by chunkerInitialize(), and chunkerNew().

5.3.4.4 Boolean chunkerUseChunker = FALSE [static]

indicates wether the chunker is used or not Definition at line 72 of file chunker.c.

Referenced by chunkerInitialize(), and chunkerNew().

5.4 Command - The CDG Scripting Language

5.4.1 Detailed Description

Author:
Ingo Schroeder (see also AUTHORS and THANKS for more)

Id
command.c,v 1.309 2004/10/04 14:36:12 micha Exp

This module implements the `CDG` scripting interface, that is, all the commands that are available on the `cdgp` prompt or executable via commandEval().

Note: do not confuse the scripting interface language with the constraint grammar language or the language bindings. They are all separate things.

Each valid `command` corresponds to a C function `cmdCommand` that implements this command all commands are listed in interface_commands. Each command is defined by a Command - The CDG Scripting Language structure, where the name, the interface completion commands, a little help message for that command etc are defined.

The following commands exist:

- activate, cmdActivate(): activates a section
- annotation, cmdAnnotation(): prints out one or all annotation
- anno2parse, cmdAnno2Parse(): build a parse from an annotation and evaluate it
- chunk, cmdChunk(): call a chunk parser on a lattice
- closedb, cmdCloseDB(): closes the database
- compareparses, cmdCompareParses(): compares the structures of two parses
- compile, cmdCompile(): compiles the current grammar
- constraint, cmdConstraint(): prints out one or all constraints
- deactivate, cmdDeactivate(): deactivates a section
- distance, cmdDistance(): prints the distance matrix of a net
- edges, cmdEdges(): prints out one or all edges of a constraint net
- frobbing, cmdFrobbing(): transforms an arbitrary assignment into a solution
- gls, cmdGls(): solve a constraintnet using guided local search
- help, cmdHelp(): gives a short help
- hierarchy, cmdHierarchy(): prints out one or all hierarchies
- hook, cmdHook(): toggle hook-system on or off"
- incrementalcompletion, cmdIncrementalCompletion(): incremental completion of parses
- inputwordgraph, cmdInputwordgraph(): creates new wordgraph
- isearch, cmdISearch(): incremental parsing of a wordgraph
- level, cmdLevel(): prints out one or all level declarations

- levelsort, cmdLevelsort(): set/check the priority of the defined levels
- lexicon, cmdLexicon(): prints out one or all lexical entries
- license, cmdLicense(): prints out the license
- load, cmdLoad(): loads a file
- ls, cmdLs(): lists one or more files
- net, cmdNet(): prints out one or all constraint net
- netdelete, cmdNetdelete(): deletes a constraint net
- netsearch, cmdNetsearch(): searches a net for globally best solutions
- newnet, cmdNewnet(): builds a new constraint net from a wordgraph
- nonspeccompatible, cmdNonSpecCompatible(): check compatibility of constraints for incremental parsing
- parsedelete, cmdParsedelete(): deletes a parse
- printparse, cmdPrintParse(): prints the structure of a parse
- printparses, cmdPrintParses(): prints out all parses of a constraint net
- quit, cmdQuit(): quits
- renewnet, cmdRenewnet(): restores a net to pristine state
- reset, cmdReset(): discards all loaded and computed information
- section, cmdSection(): prints out one or all section
- set, cmdSet(): set various system variables
- showlevel, cmdShowlevel(): toggles whether a level is shown or not
- status, cmdStatus(): describes the status of the system
- tagger, cmdTagger(): start/stop POS tagger
- testing, cmdTesting(): undocumented command for testing
- useconstraint, cmdUseconstraint(): toggles whether a constraint is used or not
- uselevel, cmdUselevel(): toggles whether a level is used or not
- uselexicon, cmdUseLexicon(): specify which lexicon and which index database to use
- version, cmdVersion(): prints version
- verify, cmdVerify(): compares parse to annotation
- weight, cmdWeight(): changes a constraint's weight
- wordgraph, cmdWordgraph(): prints out one or all wordgraph
- writenet, cmdWriteNet(): writes a TeX representation of the net
- writeparses, cmdWriteParses(): writes XFig and LaTeX files with the parses
- writewordgraph, cmdWriteWordgraph(): writes a wordgraph in an XFig file

Data Structures

- struct Command

Defines

- #define STARTUPMSG

Typedefs

- typedef Boolean CommandFunction (int no, char **args)

Functions

- char * annotation_completion_function (const char *, int)
- Boolean cmdActivate (int no, char **args)
- Boolean cmdAnno2Parse (int no, char **args)
- Boolean cmdAnnos2prolog (int no, char **args)
- Boolean cmdAnnotation (int no, char **args)
- Boolean cmdChart (int no, char **args)
- Boolean cmdChunk (int no, char **args)
- Boolean cmdCloseDB ()
- Boolean cmdCompareParses (int no, char **args)
- Boolean cmdCompile (int no, char **args)
- Boolean cmdConstraint (int no, char **args)
- Boolean cmdDeactivate (int no, char **args)
- Boolean cmdDistance (int no, char **args)
- Boolean cmdEdges (int no, char **args)
- Boolean cmdFrobbing (int no, char **args)
- Boolean cmdGls (int no, char **args)
- Boolean cmdHelp (int no, char **args)
- Boolean cmdHierarchy (int no, char **args)
- Boolean cmdHook (int no, char **args)
- Boolean cmdIncrementalCompletion (int no, char **args)
- Boolean cmdInputwordgraph (int no, char **args)
- Boolean cmdISearch (int no, char **args)
- Boolean cmdLevel (int no, char **args)
- Boolean cmdLevelsort (int no, char **args)
- Boolean cmdLexicon (int no, char **args)
- Boolean cmdLicense (int no, char **args)
- Boolean cmdLoad (int no, char **args)
- Boolean cmdLs (int no, char **args)
- Boolean cmdNet (int no, char **args)
- Boolean cmdNetdelete (int no, char **args)
- Boolean cmdNetsearch (int no, char **args)
- Boolean cmdNewnet (int no, char **args)
- Boolean cmdNonSpecCompatible (int no, char **args)
- Boolean cmdParsedelete (int no, char **args)
- Boolean cmdParses2prolog (int no, char **args)

- Boolean cmdPrintParse (int no, char **args)
- Boolean cmdPrintParses (int no, char **args)
- Boolean cmdQuit (int no, char **args)
- Boolean cmdRenewnet (int no, char **args)
- Boolean cmdReset (int no, char **args)
- Boolean cmdSection (int no, char **args)
- Boolean cmdSet (int no, char **args)
- Boolean cmdShift (int no, char **args)
- Boolean cmdShowlevel (int no, char **args)
- Boolean cmdStatus (int no, char **args)
- Boolean cmdTagger (int no, char **args)
- Boolean cmdTesting (int no, char **args)
- Boolean cmdUseconstraint (int no, char **args)
- Boolean cmdUselevel (int no, char **args)
- Boolean cmdUseLexicon (int no, char **args)
- Boolean cmdVerify (int no, char **args)
- Boolean cmdVersion (int no, char **args)
- Boolean cmdWeight (int no, char **args)
- Boolean cmdWordgraph (int no, char **args)
- Boolean cmdWriteAnno (int no, char **args)
- Boolean cmdWriteNet (int no, char **args)
- Boolean cmdWriteParses (int no, char **args)
- Boolean cmdWriteWordgraph (int no, char **args)
- char * command_completion_function (const char *, int)
- Boolean commandEval (String line)
- Boolean commandLoop (String prompt)
- char * constraint_completion_function (const char *, int)
- char * frob_method_completion_function (const char *, int)
- String getNextArgument (String s, int *index, int stop)
- char * hierarchy_completion_function (const char *, int)
- char * hook_completion_function (const char *, int)
- char ** interface_completion (String text, int start, int end)
- char * level_completion_function (const char *, int)
- char * levelsort_completion_function (const char *, int)
- char * lexicon_completion_function (const char *, int)
- char * make_rl_string (char *)
- char * net_completion_function (const char *, int)
- char * parse_completion_function (const char *, int)
- char * search_method_completion_function (const char *, int)
- char * section_completion_function (const char *, int)
- char * set_completion_function (const char *, int)
- char * word_completion_function (const char *, int)
- char * wordgraph_completion_function (const char *, int)

Variables

- Boolean commandLoopFlag = TRUE
- List interface_cell = NULL
- Command interface_commands [ ]
- HashIterator interface_hashiterator = NULL
- int interface_index = 0
- int interface_length = 0
- List interface_list = NULL

5.4.2 Define Documentation

5.4.2.1 #define STARTUPMSG

Value:

```
"\nCDG parser version " VERSION ", build " BUILD "\n" \
"\n" \
"Copyright (C) 1997-2004 The CDG Team\n"\
"The CDG parser comes with ABSOLUTELY NO WARRANTY.\n"\
"This is free software, and you are welcome to redistribute it\n"\
"under certain conditions; type ‘license’ for details.\n"\
"\n"\
"For more information see\n"\
"\n"\
"  http://nats-www.informatik.uni-hamburg.de/~dawai\n"\
"\n"\
"The CDG Team can be contacted at\n"\
"\n"\
"  cdg@nats.informatik.uni-hamburg.de\n"\
"\n"\
"Type ‘help’ for a short help.\n"\
"\n"\
"\n"\
""
```

message to be displayed at startup Definition at line 30 of file command.h.

Referenced by cmdVersion().

5.4.3 Typedef Documentation

5.4.3.1 typedef Boolean CommandFunction(int no, char **args)

type of a function that implements a scripting command.

The first parameter `no` is the number of arguments entered by the user after the command name. The array `args` holds these arguments as a list of plain strings. For example, the command "\c newnet \c s1" contains one command and argument. To handle it, the function cmdNewnet() will be called with two arguments: the number 1 (as we have one argument) and an array containing the argument strings, which is one here: "s1".

The job of a CommandFunction() is to check the arguments for consistency and then either execute the action specified by the command or give reasons why they are incorrect.

Each command returns a Boolean which is TRUE on a successful command execution and otherwise FALSE, that is when an error occurred. Definition at line 161 of file command.c.

5.4.4 Function Documentation

5.4.4.1 char * annotation_completion_function (const char * *text*, int *state*)

Compute completions for annotations. Definition at line 643 of file command.c.

References interface_cell, interface_length, interface_list, make_rl_string(), and NULL.

5.4.4.2 Boolean cmdActivate (int *no*, char ** *args*)

Activate constraint classes.

All constraint classes that are named as arguments are activated, that is, their field ->active is set to TRUE. The effect is that these constraints are used (again) for evaluation. Since this changes the basis of evaluation, this is treated like a change in the grammar, i.e. all previously computed structures become invalid and are deleted. Definition at line 1894 of file command.c.

References cdgDeleteComputed(), FALSE, NULL, and TRUE.

5.4.4.3 Boolean cmdAnno2Parse (int *no*, char ** *args*)

Build a parse from an annotation and evaluate it against the current grammar. Definition at line 1633 of file command.c.

References CDG_ERROR, CDG_INFO, CDG_PROGRESS, CDG_WARNING, cdgCtrlCAllowed, cdgCtrlCTrapped, cdgPrintf(), dbAvailable(), dbLoadAll(), FALSE, lgDelete(), lgNew(), NULL, and TRUE.

5.4.4.4 Boolean cmdAnnos2prolog (int *no*, char ** *args*)

Save all annotations to a file in Prolog format. Definition at line 4008 of file command.c.

References CDG_ERROR, CDG_INFO, cdgPrintf(), FALSE, NULL, and TRUE.

5.4.4.5 Boolean cmdAnnotation (int *no*, char ** *args*)

Print the specified annotation entries. Definition at line 1593 of file command.c.

References CDG_DEFAULT, CDG_ERROR, cdgCtrlCAllowed, cdgCtrlCTrapped, cdgPrintf(), FALSE, NULL, and TRUE.

5.4.4.6 Boolean cmdChart (int *no*, char ** *args*)

Perform chart-based search. Definition at line 4049 of file command.c.

5.4.4.7 Boolean cmdChunk (int *no*, char ** *args*)

Chunk the specified wordgraph. Definition at line 3825 of file command.c.

References CDG_ERROR, CDG_INFO, CDG_PROFILE, cdgCtrlCAllowed, cdgCtrlCTrapped, cdgPrintf(), Chunker, chunkerChunk(), chunkerDelete(), chunkerNew(), chunkerPrintChunks(), DefaultChunker, FALSE, lgDelete(), lgNew(), NULL, Timer, timerElapsed(), timerFree(), timerNew(), and TRUE.

5.4.4.8 Boolean cmdCloseDB ()

Close the lexicon database. Definition at line 3960 of file command.c.

References dbClose().

5.4.4.9 Boolean cmdCompareParses (int *no*, char ** *args*)

Compare the specified parses. Definition at line 1926 of file command.c.

References CDG_ERROR, cdgCtrlCAllowed, cdgCtrlCTrapped, cdgParses, cdgPrintf(), FALSE, NULL, and TRUE.

5.4.4.10 Boolean cmdCompile (int *no*, char ** *args*)

Compile current grammar.

Currently broken. Definition at line 1198 of file command.c.

References CDG_ERROR, CDG_INFO, cdgPrintf(), comCompile(), comLoad(), evalEvaluationMethod, FALSE, and TRUE.

5.4.4.11 Boolean cmdConstraint (int *no*, char ** *args*)

Print the specified constraints. Definition at line 1229 of file command.c.

References CDG_DEFAULT, CDG_ERROR, cdgPrintf(), FALSE, NULL, and TRUE.

5.4.4.12 Boolean cmdDeactivate (int *no*, char ** *args*)

Deactivate constraint classes.

All constraint classes that are named as arguments are deactivated, that is, their field ->active is set to FALSE. The effect is that these constraints are not used for evaluation, as if they had never been defined. Since this changes the basis of evaluation, this is treated like a change in the grammar, i.e. all previously computed structures become invalid and are deleted. Definition at line 1855 of file command.c.

References cdgDeleteComputed(), FALSE, NULL, and TRUE.

5.4.4.13 Boolean cmdDistance (int *no*, char ** *args*)

Print the distance matrix of the specified net. Definition at line 3392 of file command.c.

References CDG_DEFAULT, CDG_ERROR, cdgPrintf(), cnFindNet(), ConstraintNet, FALSE, GraphemNode, LexemGraphStruct::graphemnodes, LexemNodeStruct::lexem, ConstraintNetStruct::lexemgraph, LexemNode, lgDistanceOfNodes(), NULL, and TRUE.

5.4.4.14 Boolean cmdEdges (int *no*, char ** *args*)

Print edges of the specified constraint net. Definition at line 2440 of file command.c.

References CDG_DEFAULT, CDG_ERROR, cdgNets, cdgPrintf(), cnPrintEdge(), ConstraintEdge, ConstraintNet, ConstraintNode, ConstraintNetStruct::edges, FALSE, ConstraintNetStruct::id, ConstraintNetStruct::nodes, NULL, ConstraintEdgeStruct::start, ConstraintEdgeStruct::stop, and TRUE.

5.4.4.15 Boolean cmdFrobbing (int *no*, char ** *args*)

Try to find a complete solution by transformation. Definition at line 2241 of file command.c.

References cdgCtrlCAllowed, cdgCtrlCTrapped, cdgTimeLimit, FALSE, timerSetAlarm(), timerStopAlarm(), and TRUE.

5.4.4.16 Boolean cmdGls (int *no*, char ** *args*)

Subject the specified net to a guided local search for global solutions. Definition at line 3770 of file command.c.

5.4.4.17 Boolean cmdHelp (int *no*, char ** *args*)

Print the help string for the specified CDG command. Definition at line 3905 of file command.c.

References CDG_DEFAULT, CDG_ERROR, cdgPrintf(), FALSE, interface_commands, name, NULL, and TRUE.

5.4.4.18 Boolean cmdHierarchy (int *no*, char ** *args*)

Print the specified hierarchies. Definition at line 1769 of file command.c.

References CDG_DEFAULT, CDG_ERROR, cdgCtrlCAllowed, cdgCtrlCTrapped, cdgPrintf(), FALSE, NULL, and TRUE.

5.4.4.19 Boolean cmdHook (int *no*, char ** *args*)

Set or query hooks. Definition at line 3680 of file command.c.

References HookStruct::active, CDG_DEFAULT, CDG_ERROR, CDG_HOOK, CDG_INFO, cdgPrintf(), HookStruct::count, FALSE, hkFindNoOfHook(), hkHooks, hkVerbosity, Hook, HookStruct::name, NULL, and TRUE.

5.4.4.20 Boolean cmdIncrementalCompletion (int *no*, char ** *args*)

Parsing problems are created incrementally over prefixes of the word graph and solved individually, with the solution of one problem guiding the search in the next one. Definition at line 3503 of file command.c.

References CDG_ERROR, CDG_INFO, CDG_PROFILE, cdgCtrlCAllowed, cdgCtrlCTrapped, cdgPrintf(), cnEdgesFlag, CnEdgesType, FALSE, NULL, scUseCache, Timer, timerElapsed(), timerFree(), timerNew(), and TRUE.

5.4.4.21 Boolean cmdInputwordgraph (int *no*, char ** *args*)

Build a new wordgraph. Definition at line 3346 of file command.c.

References CDG_ERROR, CDG_INFO, cdgPrintf(), FALSE, NULL, and TRUE.

5.4.4.22 Boolean cmdISearch (int *no*, char ** *args*)

Perform a complete search on increasing prefixes of the word graph. Definition at line 3563 of file command.c.

References CDG_ERROR, CDG_INFO, CDG_PROFILE, cdgCtrlCAllowed, cdgCtrlCTrapped, cdgNets, cdgPrintf(), cnMostRecentlyCreatedNet, ConstraintNet, FALSE, NULL, Timer, timerElapsed(), timerFree(), timerNew(), and TRUE.

5.4.4.23 Boolean cmdLevel (int *no*, char ** *args*)

Print the specified level declarations. Definition at line 1253 of file command.c.

References CDG_DEFAULT, CDG_ERROR, cdgPrintf(), FALSE, NULL, and TRUE.

5.4.4.24 Boolean cmdLevelsort (int *no*, char ** *args*)

Sort all levels according to the specified order and display the new order. Definition at line 3660 of file command.c.

References CDG_ERROR, CDG_INFO, cdgPrintf(), FALSE, and TRUE.

5.4.4.25 Boolean cmdLexicon (int *no*, char ** *args*)

Print the specified lexicon entries. Definition at line 1454 of file command.c.

References CDG_DEFAULT, CDG_INFO, cdgCtrlCAllowed, cdgCtrlCTrapped, cdgPrintf(), FALSE, NULL, and TRUE.

5.4.4.26 Boolean cmdLicense (int *no*, char ** *args*)

Print the General Public License. Definition at line 2948 of file command.c.

References CDG_DEFAULT, cdgPrintf(), and TRUE.

5.4.4.27 Boolean cmdLoad (int *no*, char ** *args*)

Load one or more files. Definition at line 2871 of file command.c.

References CDG_ERROR, CDG_INFO, cdgDeleteComputed(), cdgExecPragmas(), cdgPrintf(), evalEvaluationMethod, FALSE, NULL, and TRUE.

5.4.4.28 Boolean cmdLs (int *no*, char ** *args*)

List one or more files.

This simply spawns the system command `ls`. Definition at line 1163 of file command.c.

References CDG_ERROR, CDG_WARNING, cdgPrintf(), FALSE, NULL, and TRUE.

5.4.4.29 Boolean cmdNet (int *no*, char ** *args*)

Print the specified constraint net. Definition at line 2021 of file command.c.

References CDG_DEFAULT, CDG_ERROR, cdgCtrlCAllowed, cdgCtrlCTrapped, cdgNets, cdgPrintf(), cnMostRecentlyCreatedNet, cnPrint(), ConstraintNet, FALSE, NULL, and TRUE.

5.4.4.30 Boolean cmdNetdelete (int *no*, char ** *args*)

Delete constraint nets.

If no argument is given, delete all known constraint nets. Otherwise, delete all named nets. Definition at line 2389 of file command.c.

References CDG_ERROR, cdgNets, cdgPrintf(), cdgProblems, cnDelete(), cnMostRecentlyCreatedNet, ConstraintNet, FALSE, and NULL.

5.4.4.31 Boolean cmdNetsearch (int *no*, char ** *args*)

Perform a complete search for globally best solution. Definition at line 2115 of file command.c.

References CDG_ERROR, CDG_INFO, CDG_SEARCHRESULT, cdgCtrlCAllowed, cdgCtrlCTrapped, cdgNets, cdgPrintf(), cnMostRecentlyCreatedNet, cnPrintInfo(), cnPrintParses(), ConstraintNet, FALSE, hkVerbosity, ConstraintNetStruct::id, NULL, ConstraintNetStruct::parses, and TRUE.

5.4.4.32 Boolean cmdNewnet (int *no*, char ** *args*)

Build a new constraint net. Definition at line 3246 of file command.c.

References CDG_ERROR, CDG_INFO, CDG_PROFILE, CDG_WARNING, cdgCtrlCAllowed, cdgCtrlCTrapped, cdgNets, cdgPrintf(), cnBuild(), cnPrintInfo(), ConstraintNet, FALSE, ConstraintNetStruct::id, NULL, Timer, timerElapsed(), timerFree(), timerNew(), and TRUE.

5.4.4.33 Boolean cmdNonSpecCompatible (int *no*, char ** *args*)

Report whether the specified constraints are suitable for processing underspecified subordinations. Definition at line 3449 of file command.c.

References CDG_DEFAULT, CDG_ERROR, CDG_INFO, cdgPrintf(), FALSE, NULL, and TRUE.

5.4.4.34 Boolean cmdParsedelete (int *no*, char ** *args*)

Delete the specified parse. Definition at line 2305 of file command.c.

References CDG_ERROR, CDG_INFO, cdgParses, cdgPrintf(), FALSE, NULL, and TRUE.

5.4.4.35 Boolean cmdParses2prolog (int *no*, char ** *args*)

Save all parses to a file in Prolog format. Definition at line 3969 of file command.c.

References CDG_ERROR, CDG_INFO, cdgParses, cdgPrintf(), FALSE, NULL, and TRUE.

5.4.4.36 Boolean cmdPrintParse (int *no*, char ** *args*)

Prints the specified Parse on stdout. Definition at line 1975 of file command.c.

References CDG_ERROR, cdgCtrlCAllowed, cdgCtrlCTrapped, cdgParses, cdgPrintf(), FALSE, NULL, and TRUE.

5.4.4.37 Boolean cmdPrintParses (int *no*, char ** *args*)

Print parses of the specified net. Definition at line 2266 of file command.c.

References CDG_ERROR, cdgCtrlCAllowed, cdgCtrlCTrapped, cdgPrintf(), cnFindNet(), cnMostRecentlyCreatedNet, cnPrintInfo(), cnPrintParses(), ConstraintNet, FALSE, NULL, ConstraintNetStruct::parses, and TRUE.

5.4.4.38 Boolean cmdQuit (int *no*, char ** *args*)

Leave the command loop.

See also:
commandLoop

Definition at line 1151 of file command.c.

References commandLoopFlag, FALSE, and TRUE.

Referenced by commandLoop().

5.4.4.39 Boolean cmdRenewnet (int *no*, char ** *args*)

Restore the specified net to original state. Definition at line 3306 of file command.c.

References CDG_ERROR, CDG_INFO, cdgPrintf(), cnFindNet(), cnMostRecentlyCreatedNet, cnPrintInfo(), cnRenew(), ConstraintNet, FALSE, NULL, and TRUE.

5.4.4.40 Boolean cmdReset (int *no*, char ** *args*)

Discard all loaded and computed information. Definition at line 2847 of file command.c.

References CDG_ERROR, cdgDeleteComputed(), cdgPrintf(), FALSE, and TRUE.

5.4.4.41 Boolean cmdSection (int *no*, char ** *args*)

Print the specified constraint sections. Definition at line 1799 of file command.c.

References CDG_DEFAULT, CDG_ERROR, cdgPrintf(), FALSE, NULL, and TRUE.

5.4.4.42 Boolean cmdSet (int *no*, char ** *args*)

Set the specified CDG variable. Definition at line 1820 of file command.c.

References CDG_ERROR, CDG_INFO, cdgPrintf(), FALSE, and NULL.

5.4.4.43 Boolean cmdShift (int *no*, char ** *args*)

Simulate shift-reduce parsing. Definition at line 1318 of file command.c.

References cdgCtrlCAllowed, cdgCtrlCTrapped, cdgTimeLimit, FALSE, timerSetAlarm(), timerStopAlarm(), and TRUE.

5.4.4.44 Boolean cmdShowlevel (int *no*, char ** *args*)

Toggle whether the specified level is shown or not. Definition at line 1343 of file command.c.

References CDG_ERROR, CDG_INFO, cdgPrintf(), FALSE, NULL, and TRUE.

5.4.4.45 Boolean cmdStatus (int *no*, char ** *args*)

Print status information. Definition at line 2659 of file command.c.

References CDG_DEBUG, CDG_DEFAULT, CDG_ERROR, CDG_EVAL, CDG_HINT, CDG_HOOK, CDG_INFO, CDG_PROFILE, CDG_PROGRESS, CDG_PROLOG, CDG_SEARCHRESULT, CDG_-WARNING, CDG_XML, cdgNets, cdgParses, cdgPrintf(), cnEdgesFlag, cnShowDeletedFlag, cn-SortNodesMethod, cnUnaryPruningFraction, evalEvaluationMethod, evalPeekValueMethod, evalSloppy-SubsumesWarnings, hkVerbosity, lgCompactLVs, NULL, scUseCache, and TRUE.

5.4.4.46 Boolean cmdTagger (int *no*, char ** *args*)

Start or stop the tagger. Definition at line 2168 of file command.c.

References CDG_ERROR, cdgPrintf(), FALSE, and TRUE.

5.4.4.47 Boolean cmdTesting (int *no*, char ** *args*)

Undocumented command for testing mode=1: determine base line for accuracy mode=2: determine base line for accuracy (TODO: is that correct??) mode=3: compare two lexica bit for bit mode=4: approve compiled grammar Definition at line 2193 of file command.c.

References CDG_ERROR, cdgPrintf(), comApprove(), FALSE, and TRUE.

5.4.4.48 Boolean cmdUseconstraint (int *no*, char ** *args*)

Toggle whether the specified constraint is used or not. Definition at line 1380 of file command.c.

References CDG_ERROR, CDG_INFO, cdgDeleteComputed(), cdgPrintf(), FALSE, NULL, and TRUE.

5.4.4.49 Boolean cmdUselevel (int *no*, char ** *args*)

Toggle whether the specified level is used or not. Definition at line 1411 of file command.c.

References CDG_ERROR, CDG_INFO, cdgDeleteComputed(), cdgPrintf(), FALSE, NULL, and TRUE.

5.4.4.50 Boolean cmdUseLexicon (int *no*, char ** *args*)

Specifies a file to be used for autoloading lexicon items.

The parameter must be string that is used as the file name. The file of cdg input must be called S.cdg, and the index must be called S.db.

If these files are not in the current working directory they are also searched in other directories that input was loaded from. Definition at line 3942 of file command.c.

References CDG_ERROR, cdgPrintf(), dbOpen(), FALSE, and TRUE.

5.4.4.51 Boolean cmdVerify (int *no*, char ** *args*)

Compare parse to annotation. Definition at line 3778 of file command.c.

References CDG_ERROR, CDG_INFO, cdgPrintf(), FALSE, NULL, and TRUE.

5.4.4.52 Boolean cmdVersion (int *no*, char ** *args*)

Print the CDG version. Definition at line 3236 of file command.c.

References CDG_DEFAULT, cdgPrintf(), STARTUPMSG, and TRUE.

5.4.4.53 Boolean cmdWeight (int *no*, char ** *args*)

Adjust the weight of a constraint. Definition at line 2060 of file command.c.

References CDG_ERROR, CDG_INFO, cdgPrintf(), FALSE, and TRUE.

5.4.4.54 Boolean cmdWordgraph (int *no*, char ** *args*)

Print wordgraphs. Definition at line 1508 of file command.c.

References CDG_DEFAULT, CDG_ERROR, cdgCtrlCAllowed, cdgCtrlCTrapped, cdgPrintf(), FALSE, NULL, and TRUE.

5.4.4.55 Boolean cmdWriteAnno (int *no*, char ** *args*)

Write best Parse of a net to disk as an annotation. Definition at line 2540 of file command.c.

References bCompare(), CDG_ERROR, cdgNets, cdgPrintf(), cnMostRecentlyCreatedNet, ConstraintNet, FALSE, ConstraintNetStruct::id, NULL, ConstraintNetStruct::parses, and TRUE.

5.4.4.56 Boolean cmdWriteNet (int *no*, char ** *args*)

Write the specified constraint net to an XFig file. Definition at line 2499 of file command.c.

References CDG_ERROR, cdgCtrlCAllowed, cdgCtrlCTrapped, cdgNets, cdgPrintf(), cnMostRecently-CreatedNet, ConstraintNet, FALSE, NULL, and TRUE.

5.4.4.57 Boolean cmdWriteParses (int *no*, char ** *args*)

Write the specified parses to XFig and LaTeX files. Definition at line 2586 of file command.c.

References CDG_ERROR, cdgCtrlCAllowed, cdgCtrlCTrapped, cdgPrintf(), cnFindNet(), cnMost-RecentlyCreatedNet, ConstraintNet, FALSE, NULL, ConstraintNetStruct::parses, and TRUE.

5.4.4.58 Boolean cmdWriteWordgraph (int *no*, char ** *args*)

Write the specified wordgraphs to XFig file. Definition at line 1547 of file command.c.

References CDG_ERROR, cdgCtrlCAllowed, cdgCtrlCTrapped, cdgPrintf(), FALSE, NULL, and TRUE.

5.4.4.59 char * command_completion_function (const char * *text*, int *state*)

Compute the completions for commands.

This is one of many functions provided to pass information to the readline library. These functions all have basically the same structure which is required by readline: they must return a newly allocated string every time they are called. They vary only in which strings are returned as possible completions.

The parameter "text" is the partial string typed by the user so far. The completion function must now offer the readline library suitable strings to complete it. This particular function knows what commands the CDG shell understands, so it iterates over the array interface_commands[] internally. The other completion functions will iterate over other structures, obviously. Definition at line 462 of file command.c.

References interface_commands, interface_index, interface_length, make_rl_string(), name, and NULL.

Referenced by interface_completion().

5.4.4.60 Boolean commandEval (String *line*)

CDG command dispatch routine.

This function interprets one command of the scripting language.

Parameters:
line the command line to be evaluated

Returns:
TRUE on a successful command execution, otherwise FALSE.

Definition at line 1070 of file command.c.

References CDG_ERROR, CDG_XML, cdgFlush(), cdgFreeString(), cdgPrintf(), FALSE, function, getNextArgument(), hkVerbosity, interface_commands, name, NULL, and TRUE.

Referenced by cdgExecPragmas(), and commandLoop().

5.4.4.61 Boolean commandLoop (String *prompt*)

CDG main event loop.

This function reads and executes commands and terminates when the commandLoopFlag has been set to FALSE.

Parameters:
prompt to be displayed at the command line

Returns:
the boolean result of the last command, that is TRUE on success and else FALSE.

Definition at line 1003 of file command.c.

References CDG_DEFAULT, CDG_WARNING, cdgPrintf(), cmdQuit(), commandEval(), commandLoopFlag, interface_completion(), NULL, and TRUE.

5.4.4.62 char * constraint_completion_function (const char * *text*, int *state*)

Compute completions for constraints. Definition at line 499 of file command.c.

References interface_cell, interface_length, interface_list, make_rl_string(), and NULL.

5.4.4.63 char * frob_method_completion_function (const char * *text*, int *state*)

Compute completions for frobbing methods. Definition at line 787 of file command.c.

References interface_index, interface_length, make_rl_string(), and NULL.

5.4.4.64 String getNextArgument (String *s*, int * *index*, int *stop*)

Return a copy of the next command word in S.

Command words are searched in the part of S starting at INDEX and not exceeding STOP. Command words are separated by instances of the characters defined in rl_basic_word_break_characters by the readline library.

(void)strncpy(buffer, &s[start], *index - start - 1); buffer[*index - start - 1] = ”; Definition at line 859 of file command.c.

References CDG_WARNING, cdgPrintf(), cdgXCDG, and NULL.

Referenced by commandEval(), and interface_completion().

5.4.4.65 char * hierarchy_completion_function (const char * *text*, int *state*)

Compute completions for hierarchies. Definition at line 668 of file command.c.

References interface_cell, interface_length, interface_list, make_rl_string(), and NULL.

5.4.4.66 char * hook_completion_function (const char * *text*, int *state*)

Compute completions for known hooks. Definition at line 808 of file command.c.

References hkHooks, Hook, interface_index, interface_length, make_rl_string(), and NULL.

5.4.4.67 char ** interface_completion (String *text*, int *start*, int *end*)

Provide context sensitive command completion.

This function is passed to the readline library as the rl_attempted_completion_function. See the readline documentation for details of its behaviour. Definition at line 932 of file command.c.

References args, cdgFreeString(), command_completion_function(), getNextArgument(), interface_commands, name, NULL, and same.

Referenced by commandLoop().

5.4.4.68 char * level_completion_function (const char * *text*, int *state*)

Compute completions for the command level. Definition at line 523 of file command.c.

References interface_length, interface_list, make_rl_string(), and NULL.

5.4.4.69 char * levelsort_completion_function (const char * *text*, int *state*)

Compute completions for the command levelsort. Definition at line 544 of file command.c.

References interface_length, interface_list, make_rl_string(), and NULL.

5.4.4.70 char * lexicon_completion_function (const char * *text*, int *state*)

Compute completions for lexical entries. Definition at line 569 of file command.c.

References interface_hashiterator, interface_length, make_rl_string(), and NULL.

5.4.4.71 char * make_rl_string (char * *s*)

Produce a string suitable for internal processing by readline.

This function serves two purposes:

1. it accepts a string and returns a clone of it. This is necessary because the readline library insists on doing its own deallocating.

1. if the string passed contains whitespace, it wraps quotes around it so that the CDG shell will parse it as one string later. That way, completion works even for identifiers with whitespace in them (highly discouraged but possible).

TODO: This is not yet quite correct. It can handle identifiers like "SYN", "um zu", and "it's". But it can fail if a string contains both whitespace and single quotes:

"Hand me the 'scope, skipper!"

My excuse is that I can think of no reason whatsoever why anybody would use that sort of identifier in a constraint grammar. Definition at line 432 of file command.c.

References NULL.

Referenced by annotation_completion_function(), command_completion_function(), constraint_completion_function(), frob_method_completion_function(), hierarchy_completion_function(), hook_completion_function(), level_completion_function(), levelsort_completion_function(), lexicon_completion_function(), net_completion_function(), parse_completion_function(), search_method_completion_function(), section_completion_function(), set_completion_function(), and wordgraph_completion_function().

5.4.4.72 char * net_completion_function (const char * *text*, int *state*)

Compute completions for constraint nets. Definition at line 693 of file command.c.

References cdgNets, interface_cell, interface_length, interface_list, make_rl_string(), and NULL.

5.4.4.73 char * parse_completion_function (const char * *text*, int *state*)

Compute completions for parses. Definition at line 830 of file command.c.

References cdgParses, interface_cell, interface_length, interface_list, make_rl_string(), and NULL.

5.4.4.74 char * search_method_completion_function (const char * *text*, int *state*)

Compute completions for search methods. Definition at line 718 of file command.c.

References interface_index, interface_length, make_rl_string(), and NULL.

5.4.4.75 char * section_completion_function (const char * *text*, int *state*)

Compute completions for sections. Definition at line 738 of file command.c.

References interface_length, interface_list, make_rl_string(), and NULL.

5.4.4.76 char * set_completion_function (const char * *text*, int *state*)

Compute completions for the set command Definition at line 759 of file command.c.

References interface_index, interface_length, make_rl_string(), and NULL.

5.4.4.77 char * word_completion_function (const char * *text*, int *state*)

Compute completions for orthographic words. Definition at line 593 of file command.c.

References interface_hashiterator, interface_length, and NULL.

5.4.4.78 char * wordgraph_completion_function (const char * *text*, int *state*)

Compute completions for wordgraphs. Definition at line 620 of file command.c.

References interface_length, interface_list, make_rl_string(), and NULL.

5.4.5 Variable Documentation

5.4.5.1 Boolean commandLoopFlag = TRUE [static]

flag indicating the end of the command main loop. Entering the commandLoop() this is set to TRUE. commandLoop() exits if this global variable is set to FALSE. Definition at line 202 of file command.c.

Referenced by cmdQuit(), and commandLoop().

5.4.5.2 List interface_cell = NULL [static]

Todo

Write an explanation of the interface and the completion gadget

Definition at line 192 of file command.c.

Referenced by annotation_completion_function(), constraint_completion_function(), hierarchy_completion_function(), net_completion_function(), and parse_completion_function().

5.4.5.3 Command interface_commands[ ]

array of all registered wcdg scripting commands. Definition at line 227 of file command.c.

Referenced by cmdHelp(), command_completion_function(), commandEval(), and interface_completion().

5.4.5.4 HashIterator interface_hashiterator = NULL [static]

Todo
Write an explanation of the interface and the completion gadget

Definition at line 195 of file command.c.

Referenced by lexicon_completion_function(), and word_completion_function().

5.4.5.5 int interface_index = 0 [static]

Todo
Write an explanation of the interface and the completion gadget

Definition at line 183 of file command.c.

Referenced by command_completion_function(), frob_method_completion_function(), hook_completion_function(), search_method_completion_function(), and set_completion_function().

5.4.5.6 int interface_length = 0 [static]

Todo
Write an explanation of the interface and the completion gadget

Definition at line 186 of file command.c.

Referenced by annotation_completion_function(), command_completion_function(), constraint_completion_function(), frob_method_completion_function(), hierarchy_completion_function(), hook_completion_function(), level_completion_function(), levelsort_completion_function(), lexicon_completion_function(), net_completion_function(), parse_completion_function(), search_method_completion_function(), section_completion_function(), set_completion_function(), word_completion_function(), and wordgraph_completion_function().

5.4.5.7 List interface_list = NULL [static]

Todo
Write an explanation of the interface and the completion gadget

Definition at line 189 of file command.c.

Referenced by annotation_completion_function(), constraint_completion_function(), hierarchy_completion_function(), level_completion_function(), levelsort_completion_function(), net_completion_function(), parse_completion_function(), section_completion_function(), and wordgraph_completion_function().

5.5 Compiler - compile a constraint grammar

5.5.1 Detailed Description

Author:
Michael Daum (see also AUTHORS and THANKS for more)

Id
compile.c,v 1.87 2004/10/04 14:36:12 micha Exp

This module implements a compiler in order to translate constraints into C code.

Data Structures

- struct ApproverStruct
- struct CompilerStruct
- struct MakeInfoStruct

Defines

- #define FINIT_GRAMMAR "finitGrammar"
- #define INIT_GRAMMAR "initGrammar"

Typedefs

- typedef ApproverStruct * Approver
- typedef CompilerStruct * Compiler
- typedef CompilerStruct CompilerStruct
- typedef MakeInfoStruct * MakeInfo
- typedef MakeInfoStruct MakeInfoStruct

Enumerations

- enum ReturnType {

  RTBoolean = (1L << 0), RTNumber = (1L << 1), RTString = (1L << 2), RTAVNode = (1L << 3),

  RTList = (1L << 4), RTConjunction = (1L << 5), RTDisjunction = (1L << 6), RTError = (1L << 7),

  RTLexemNode = (1L << 8), RTGraphemNode = (1L << 9), RTNoError = (1L << 10), RTPeek = (1L << 11),

  RTLexemPosition = (1L << 12) }

Functions

- void comAnalyzeGrammar (void)
- void comApprove (int no, char **args)
- Boolean comCompareAllLvPairs (Approver, ConstraintNet net)
- Boolean comCompareAllLvs (Approver, ConstraintNet, ConstraintNet)

- Boolean comCompareLvs (LevelValue, LevelValue)
- Boolean comCompareNets (Approver, ConstraintNet, ConstraintNet)
- Boolean comCompareWithContext (Approver, ConstraintNet net, List contextList)
- String comCompile (int no, char **args)
- String comConnextionToString (Connexion)
- int comConstraintDepth (Constraint)
- String comDirectionToString (Direction)
- String comEscapeQuotes (String)
- void comFinalize (void)
- LevelValue comFindComparableLv (ConstraintNet, LevelValue)
- void comFinitGrammar (Input thisInput)
- int comFormulaDepth (Formula)
- String comFormulaTypeToString (Formula)
- void comFree (Compiler)
- void comFreeApprover (Approver)
- int comFunctionDepth (String, List)
- void comIndent (void)
- int comIndexOfConstraint (String)
- int comIndexOfHierarchy (String)
- int comIndexOfVarInfo (VarInfo)
- Boolean comInitGrammar (Input thisInput)
- void comInitialize (void)
- Input comLoad (String filename)
- Boolean comMake (void)
- void comMakeInfoFree (MakeInfo)
- MakeInfo comMakeInfoNew (void)
- int comMaxLookupStrings (Constraint)
- int comMaxLookupStringsInFormula (Formula)
- int comMaxLookupStringsInTerm (Term)
- Compiler comNew (void)
- Approver comNewApprover (void)
- void comOutdent (void)
- int comPredicateDepth (String, List)
- void comPrint (String,...)
- void comPrintln (String,...)
- int comRegisterString (String)
- ReturnType comReturnTypeOfFormula (Formula)
- ReturnType comReturnTypeOfFunction (String, List)
- ReturnType comReturnTypeOfPredicate (String, List)
- ReturnType comReturnTypeOfTerm (Term)
- String comReturnTypeToString (ReturnType)
- int comTermDepth (Term)
- String comTermTypeToString (Term)
- Boolean comTranslate (void)
- void comTranslateAbs (List, int)
- void comTranslateArithmetics (Term, int)
- void comTranslateBetween (String, List, int)
- void comTranslateBinaryConstraints (void)
- void comTranslateBottomPeek (Term, int)
- void comTranslateChunkHead (String, List, int)

- void comTranslateConnected (String, List, int)
- void comTranslateConnexion (Formula)
- void comTranslateConstraint (Constraint)
- void comTranslateDirection (Formula)
- void comTranslateDistance (List, int)
- void comTranslateEquation (Formula, int)
- void comTranslateExists (List)
- void comTranslateFormula (Formula, int)
- void comTranslateFunction (String, List, int)
- void comTranslateGuard (String, List, int)
- void comTranslateHas (String, List, int)
- void comTranslateHeight (List, int)
- void comTranslateIs (String, List, int)
- void comTranslateLexemNodeAccess (Term, int)
- void comTranslateLexicalAccess (Term)
- void comTranslateLookup (List, int)
- void comTranslateMatch (List, int)
- void comTranslateMinMax (String, List, int)
- void comTranslateNumber (Term, int)
- void comTranslateParens (List, int)
- void comTranslateParent (List, int)
- void comTranslatePhrasequotes (List, int)
- void comTranslatePredicate (String, List, int)
- void comTranslatePrint (List, int)
- void comTranslatePts (List, int)
- void comTranslateQuotes (List, int)
- void comTranslateStartStop (String, List, int)
- void comTranslateString (Term, int)
- void comTranslateSubsumes (String, List, int)
- void comTranslateTerm (Term, Boolean, Boolean, int)
- void comTranslateTopPeek (Term, int)
- void comTranslateUnaryConstraints (void)
- void comTranslateUnder (String, List, int)
- void comTranslateUnEquation (Formula, int)
- String comValueTypeToString (Value)
- void comWriteDeclarations (void)
- void comWriteError (String,...)
- void comWriteFinitFunction (void)
- void comWriteFunctions (void)
- void comWriteHeader (void)
- void comWriteInitFunction (void)
- void comWriteWarning (String,...)

Variables

- Compiler com
- MakeInfo makeInfo

5.5.2 Define Documentation

5.5.2.1 #define FINIT_GRAMMAR "finitGrammar"

abbrev. Definition at line 51 of file compile.c.

Referenced by comFinitGrammar(), comWriteDeclarations(), and comWriteFinitFunction().

5.5.2.2 #define INIT_GRAMMAR "initGrammar"

abbrev. Definition at line 50 of file compile.c.

Referenced by comInitGrammar(), comWriteDeclarations(), and comWriteInitFunction().

5.5.3 Typedef Documentation

5.5.3.1 typedef ApproverStruct* Approver

type of an Approver Definition at line 89 of file compile.c.

Referenced by comApprove(), and comNewApprover().

5.5.3.2 typedef struct CompilerStruct* Compiler

type of a Compiler Definition at line 76 of file compile.c.

Referenced by comFree(), and comNew().

5.5.3.3 typedef struct CompilerStruct CompilerStruct

definition of a `CDG` compiler object.

5.5.3.4 typedef struct MakeInfoStruct* MakeInfo

A Pointer to a MakeInfoStruct Definition at line 106 of file compile.c.

Referenced by comMakeInfoFree(), and comMakeInfoNew().

5.5.3.5 typedef struct MakeInfoStruct MakeInfoStruct

default make settings. This structure bundles all the information that is needed to compile and link a binary `CDG` grammar. This is called `MakeInfo` in according to the normal place where such information is kept.

5.5.4 Enumeration Type Documentation

5.5.4.1 enum ReturnType

possible return types of formulas, predicates, functions, terms.

Enumeration values:

RTBoolean Boolean return type

RTNumber Number return type

RTString String return type

RTAVNode AVNode return type

RTList List return type

RTConjunction Conjunction return type

RTDisjunction Disjunction return type

RTError Syntax error "return type"

RTLexemNode LexemNode return type

RTGraphemNode GraphemNode return type

RTNoError indicate that no error is possible in the returning function

RTPeek indicate a lexicon access in the returning function

RTLexemPosition indicate the position where the returning function is peeking 0: modifier, 1: modifiee

Definition at line 111 of file compile.c.

Referenced by comReturnTypeOfFormula(), comReturnTypeOfFunction(), comReturnTypeOfPredicate(), comReturnTypeOfTerm(), comTranslateAbs(), comTranslateArithmetics(), comTranslateBetween(), comTranslateChunkHead(), comTranslateConnected(), comTranslateConstraint(), comTranslateDistance(), comTranslateEquation(), comTranslateFormula(), comTranslateGuard(), comTranslateHas(), comTranslateIs(), comTranslateLookup(), comTranslateMatch(), comTranslateMinMax(), comTranslateParens(), comTranslateParent(), comTranslatePhrasequotes(), comTranslatePrint(), comTranslateQuotes(), comTranslateStartStop(), comTranslateSubsumes(), comTranslateTerm(), comTranslateUnder(), and comTranslateUnEquation().

5.5.5 Function Documentation

5.5.5.1 void comAnalyzeGrammar (void)

analyze the currently loaded grammar Definition at line 4582 of file compile.c.

References com, comConstraintDepth(), comMaxLookupStrings(), CompilerStruct::maxLookupStrings, and CompilerStruct::maxValues.

Referenced by comTranslate().

5.5.5.2 void comApprove (int *no*, char ** *args*)

approve a compiled grammar Definition at line 5700 of file compile.c.

References Approver, CDG_DEFAULT, CDG_ERROR, CDG_WARNING, cdgCtrlCAllowed, cdgCtrlCTrapped, cdgFlush(), cdgNets, cdgPrintf(), cnBuild(), cnDelete(), comCompareNets(), comFreeApprover(), comNewApprover(), ConstraintNet, evalEvaluationMethod, EvalMethodType, FALSE, hkVerbosity, ConstraintNetStruct::id, NULL, ApproverStruct::timer, timerElapsed(), timerStart(), ApproverStruct::totalCompiledBinaryTime, ApproverStruct::totalCompiledUnaryTime, ApproverStruct::totalInterpretedBinaryTime, ApproverStruct::totalInterpretedUnaryTime, and TRUE.

Referenced by cmdTesting().

5.5.5.3 Boolean comCompareAllLvPairs (Approver *ap*, ConstraintNet *net*)

compare each pair of levelvalues in both networks Definition at line 5308 of file compile.c.

References ConstraintNetStruct::cache, CDG_ERROR, cdgCtrlCTrapped, cdgPrintf(), ConstraintViolationStruct::constraint, ConstraintNet, ConstraintViolation, cvCompare(), cvDelete(), evalBinary(), evalEvaluationMethod, FALSE, BadnessStruct::hard, ConstraintViolationStruct::lv1, ConstraintViolationStruct::lv2, BadnessStruct::no, ApproverStruct::noRounds, NULL, ConstraintViolationStruct::penalty, scDelete(), scNew(), scUseCache, BadnessStruct::soft, ApproverStruct::timer, timerElapsed(), timerStart(), ApproverStruct::totalCompiledBinaryTime, ApproverStruct::totalInterpretedBinaryTime, TRUE, and ConstraintNetStruct::values.

Referenced by comCompareNets().

5.5.5.4 Boolean comCompareAllLvs (Approver *ap*, ConstraintNet *net1*, ConstraintNet *net2*)

compare each levelvalue in both networks returns TRUE if all are equal, else FALSE Definition at line 5266 of file compile.c.

References CDG_ERROR, cdgCtrlCTrapped, cdgPrintf(), comCompareLvs(), comFindComparableLv(), ConstraintNet, FALSE, NULL, TRUE, and ConstraintNetStruct::values.

Referenced by comCompareNets().

5.5.5.5 Boolean comCompareLvs (LevelValue *lv1*, LevelValue *lv2*)

compare two levelvalues returns TRUE if equal, else FALSE Definition at line 5157 of file compile.c.

References CDG_ERROR, cdgPrintf(), FALSE, NULL, and TRUE.

Referenced by comCompareAllLvs().

5.5.5.6 Boolean comCompareNets (Approver *ap*, ConstraintNet *net1*, ConstraintNet *net2*)

compare two constraint networks Definition at line 5643 of file compile.c.

References CDG_ERROR, cdgPrintf(), comCompareAllLvPairs(), comCompareAllLvs(), comCompareWithContext(), ConstraintNet, ConstraintNode, FALSE, ConstraintNetStruct::nodes, NULL, TRUE, ConstraintNodeStruct::values, and ConstraintNetStruct::values.

Referenced by comApprove().

5.5.5.7 Boolean comCompareWithContext (Approver *ap*, ConstraintNet *net*, List *contextList*)

compare the nets after applying context_sensitive constraints Definition at line 5473 of file compile.c.

References ConstraintNetStruct::cache, CDG_ERROR, cdgCtrlCTrapped, cdgPrintf(), ConstraintViolationStruct::constraint, ConstraintNet, ConstraintViolation, cvCompare(), cvDelete(), evalBinary(), evalEvaluationMethod, FALSE, BadnessStruct::hard, ConstraintViolationStruct::lv1, ConstraintViolationStruct::lv2, BadnessStruct::no, ApproverStruct::noRounds, NULL, ConstraintViolationStruct::penalty, scDelete(), scNew(), scUseCache, BadnessStruct::soft, ApproverStruct::timer, timerElapsed(), timerStart(), ApproverStruct::totalCompiledBinaryTime, ApproverStruct::totalInterpretedBinaryTime, TRUE, and ConstraintNetStruct::values.

Referenced by comCompareNets().

5.5.5.8 String comCompile (int *no*, char ** *args*)

comCompile: entry function to this package.

- translate the currently loaded cdg into C
- make a shared object out of it
- load it

returns the name of the so file, NULL on failure Definition at line 4922 of file compile.c.

References MakeInfoStruct::cc, CompilerStruct::ccFile, CompilerStruct::ccFileName, CDG_DEFAULT, CDG_ERROR, cdgPrintf(), MakeInfoStruct::cFlags, com, comFree(), comMake(), comNew(), comTranslate(), FALSE, MakeInfoStruct::includes, MakeInfoStruct::ld, MakeInfoStruct::ldFlags, MakeInfoStruct::ldLibs, makeInfo, NULL, CompilerStruct::objFileName, CompilerStruct::soFileName, CompilerStruct::translateOnly, and TRUE.

Referenced by cmdCompile().

5.5.5.9 String comConnextionToString (Connexion *connexion*)

string representation of a connexion Definition at line 579 of file compile.c.

Referenced by comTranslateConnexion(), and comTranslateConstraint().

5.5.5.10 int comConstraintDepth (Constraint *constraint*)

compute the number of variables needed to evaluate a constraint Definition at line 4698 of file compile.c.

References comFormulaDepth(), comTermDepth(), and max.

Referenced by comAnalyzeGrammar().

5.5.5.11 String comDirectionToString (Direction *direction*)

string representation of a direction Definition at line 597 of file compile.c.

Referenced by comTranslateConstraint(), and comTranslateDirection().

5.5.5.12 String comEscapeQuotes (String *str*)

escape quotes in strings Definition at line 394 of file compile.c.

References NULL.

Referenced by comTranslateConstraint(), comTranslateEquation(), comTranslateLookup(), comTranslateMatch(), comTranslateSubsumes(), comTranslateUnEquation(), comWriteError(), comWriteInitFunction(), and comWriteWarning().

5.5.5.13 void comFinalize (void)

finalize the compiler module Definition at line 5087 of file compile.c.

References comMakeInfoFree(), and makeInfo.

Referenced by cdgFinalize().

5.5.5.14 LevelValue comFindComparableLv (ConstraintNet *net*, LevelValue *lv*)

find a lv using the same modifier-lexem, label and modifiee-lexem Definition at line 5123 of file compile.c.

References ConstraintNet, NULL, and ConstraintNetStruct::values.

Referenced by comCompareAllLvs().

5.5.5.15 void comFinitGrammar (Input *thisInput*)

finalize a dll grammar Definition at line 5065 of file compile.c.

References CDG_ERROR, cdgPrintf(), FINIT_GRAMMAR, and NULL.

5.5.5.16 int comFormulaDepth (Formula *formula*)

compute the number of variables needed to evaluate a formula Definition at line 4709 of file compile.c.

References comPredicateDepth(), comTermDepth(), and max.

Referenced by comConstraintDepth(), and comTranslateFormula().

5.5.5.17 String comFormulaTypeToString (Formula *formula*)

string representation of a formula type Definition at line 535 of file compile.c.

Referenced by comReturnTypeOfFormula(), and comTranslateFormula().

5.5.5.18 void comFree (Compiler *thisCom*)

destructor for a Compiler Definition at line 297 of file compile.c.

References cdgFreeString(), Compiler, CompilerStruct::connexions, CompilerStruct::directions, CompilerStruct::indentStrings, NULL, and CompilerStruct::strings.

Referenced by comCompile().

5.5.5.19 void comFreeApprover (Approver *ap*)

free an approver Definition at line 5111 of file compile.c.

References NULL, ApproverStruct::timer, and timerFree().

Referenced by comApprove().

5.5.5.20 int comFunctionDepth (String *functor*, List *args*)

compute the number of variables needed to evaluate a function Definition at line 4755 of file compile.c.

References comTermDepth(), max, and NULL.

Referenced by comTermDepth().

5.5.5.21 void comIndent (void)

increase indentation Definition at line 355 of file compile.c.

References com, CompilerStruct::indent, CompilerStruct::indentString, CompilerStruct::indentStrings, and min.

Referenced by comTranslateArithmetics(), comTranslateConnexion(), comTranslateConstraint(), comTranslateDirection(), comTranslateEquation(), comTranslateFormula(), comTranslateFunction(), comTranslateHas(), comTranslatePredicate(), comTranslateTopPeek(), comTranslateUnEquation(), comWriteDeclarations(), comWriteFinitFunction(), comWriteFunctions(), and comWriteInitFunction().

5.5.5.22 int comIndexOfConstraint (String *id*)

get the index of a constraint Definition at line 1238 of file compile.c.

References comWriteError(), and NULL.

Referenced by comTranslateConstraint().

5.5.5.23 int comIndexOfHierarchy (String *id*)

get the index of a hierarchy Definition at line 1217 of file compile.c.

References comWriteError(), and NULL.

Referenced by comTranslateMatch(), and comTranslateSubsumes().

5.5.5.24 int comIndexOfVarInfo (VarInfo *varInfo*)

get index of assigned variable Definition at line 1259 of file compile.c.

References com, and CompilerStruct::currentConstraint.

Referenced by comTranslateBottomPeek(), comTranslateConnexion(), comTranslateDirection(), comTranslateExists(), comTranslateLexemNodeAccess(), comTranslateLexicalAccess(), comTranslateString(), and comTranslateTopPeek().

5.5.5.25 Boolean comInitGrammar (Input *thisInput*)

initialize a dll grammar Definition at line 5043 of file compile.c.

References CDG_ERROR, cdgPrintf(), FALSE, INIT_GRAMMAR, NULL, and TRUE.

5.5.5.26 void comInitialize (void)

initialize the compiler module Definition at line 5018 of file compile.c.

References MakeInfoStruct::cc, MakeInfoStruct::cFlags, comMakeInfoNew(), MakeInfoStruct::includes, MakeInfoStruct::ld, MakeInfoStruct::ldFlags, MakeInfoStruct::ldLibs, makeInfo, and NULL.

Referenced by cdgInitialize().

5.5.5.27 Input comLoad (String *filename*)

load a dll grammar Definition at line 3790 of file compile.c.

References CDG_ERROR, CDG_INFO, cdgPrintf(), com, NULL, and CompilerStruct::soFileName.

Referenced by cmdCompile().

5.5.5.28 Boolean comMake (void)

compile a shared object from the recently translated code Definition at line 3751 of file compile.c.

References MakeInfoStruct::cc, CompilerStruct::ccFileName, CDG_DEBUG, CDG_ERROR, CDG_-INFO, cdgFlush(), cdgPrintf(), MakeInfoStruct::cFlags, com, FALSE, MakeInfoStruct::includes, Make-InfoStruct::ld, MakeInfoStruct::ldFlags, MakeInfoStruct::ldLibs, makeInfo, NULL, CompilerStruct::obj-FileName, CompilerStruct::soFileName, and TRUE.

Referenced by comCompile().

5.5.5.29 void comMakeInfoFree (MakeInfo *thisMakeInfo*)

destructor of a MakeInfo Definition at line 338 of file compile.c.

References MakeInfoStruct::cc, cdgFreeString(), MakeInfoStruct::cFlags, MakeInfoStruct::includes, MakeInfoStruct::ld, MakeInfoStruct::ldFlags, MakeInfoStruct::ldLibs, and MakeInfo.

Referenced by comFinalize().

5.5.5.30 MakeInfo comMakeInfoNew (void)

constructor for a MakeInfo Definition at line 321 of file compile.c.

References MakeInfoStruct::cc, MakeInfoStruct::cFlags, MakeInfoStruct::includes, MakeInfoStruct::ld, MakeInfoStruct::ldFlags, MakeInfoStruct::ldLibs, MakeInfo, and NULL.

Referenced by comInitialize().

5.5.5.31 int comMaxLookupStrings (Constraint *constraint*)

compute the number of strings needed for evaluationg 'lookup' functions in a constraint Definition at line 4616 of file compile.c.

References comMaxLookupStringsInFormula(), comMaxLookupStringsInTerm(), and max.

Referenced by comAnalyzeGrammar().

5.5.5.32 int comMaxLookupStringsInFormula (Formula *formula*)

compute the number of strings needed for evaluationg 'lookup' functions in a formla Definition at line 4627 of file compile.c.

References comMaxLookupStringsInTerm(), and max.

Referenced by comMaxLookupStrings().

5.5.5.33 int comMaxLookupStringsInTerm (Term *term*)

compute the number of strings needed for evaluationg 'lookup' functions in a term Definition at line 4665 of file compile.c.

References NULL.

Referenced by comMaxLookupStrings(), and comMaxLookupStringsInFormula().

5.5.5.34 Compiler comNew (void)

constructor for a Compiler Definition at line 249 of file compile.c.

References CompilerStruct::ccFileName, Compiler, CompilerStruct::connexions, CompilerStruct::currentConstraint, CompilerStruct::directions, FALSE, CompilerStruct::indent, CompilerStruct::indentString, CompilerStruct::indentStrings, CompilerStruct::needsIndent, NULL, CompilerStruct::objFileName, CompilerStruct::soFileName, CompilerStruct::strings, CompilerStruct::translateOnly, and TRUE.

Referenced by comCompile().

5.5.5.35 Approver comNewApprover (void)

allocate a new approver Definition at line 5094 of file compile.c.

References Approver, ApproverStruct::noRounds, ApproverStruct::timer, timerNew(), ApproverStruct::totalCompiledBinaryTime, ApproverStruct::totalCompiledUnaryTime, ApproverStruct::totalInterpretedBinaryTime, and ApproverStruct::totalInterpretedUnaryTime.

Referenced by comApprove().

5.5.5.36 void comOutdent (void)

decrease indentation Definition at line 365 of file compile.c.

References com, CompilerStruct::indent, CompilerStruct::indentString, CompilerStruct::indentStrings, and min.

Referenced by comTranslateArithmetics(), comTranslateConnexion(), comTranslateConstraint(), comTranslateDirection(), comTranslateEquation(), comTranslateFormula(), comTranslateFunction(), comTranslateHas(), comTranslatePredicate(), comTranslateTopPeek(), comTranslateUnEquation(), comWriteDeclarations(), comWriteFinitFunction(), comWriteFunctions(), and comWriteInitFunction().

5.5.5.37 int comPredicateDepth (String *functor*, List *args*)

compute the number of variables needed to evaluate a predicate Definition at line 4816 of file compile.c.

References comTermDepth(), max, and NULL.

Referenced by comFormulaDepth().

5.5.5.38 void comPrint (String *format*, ...)

no good c program without its own printf Definition at line 462 of file compile.c.

References CompilerStruct::ccFile, com, FALSE, CompilerStruct::indentString, and CompilerStruct::needsIndent.

Referenced by comTranslateAbs(), comTranslateArithmetics(), comTranslateBetween(), comTranslateBottomPeek(), comTranslateChunkHead(), comTranslateConnected(), comTranslateConstraint(), comTranslateDirection(), comTranslateDistance(), comTranslateEquation(), comTranslateExists(), comTranslateFormula(), comTranslateFunction(), comTranslateGuard(), comTranslateHas(), comTranslateHeight(), comTranslateIs(), comTranslateLexemNodeAccess(), comTranslateLexicalAccess(), comTranslateLookup(), comTranslateMatch(), comTranslateMinMax(), comTranslateNumber(), comTranslateParens(), comTranslateParent(), comTranslatePhrasequotes(), comTranslatePredicate(), comTranslatePrint(), comTranslatePts(), comTranslateQuotes(), comTranslateStartStop(), comTranslateString(), comTranslateSubsumes(), comTranslateTerm(), comTranslateTopPeek(), comTranslateUnder(), comTranslateUnEquation(), and comWriteDeclarations().

5.5.5.39 void comPrintln (String *format, ...*)

grant a newline at the end Definition at line 376 of file compile.c.

References CompilerStruct::ccFile, com, CompilerStruct::indentString, CompilerStruct::needsIndent, and TRUE.

Referenced by comTranslateAbs(), comTranslateArithmetics(), comTranslateBetween(), comTranslateBottomPeek(), comTranslateChunkHead(), comTranslateConnected(), comTranslateConnexion(), comTranslateConstraint(), comTranslateDirection(), comTranslateDistance(), comTranslateEquation(), comTranslateExists(), comTranslateFormula(), comTranslateFunction(), comTranslateGuard(), comTranslateHas(), comTranslateHeight(), comTranslateIs(), comTranslateLookup(), comTranslateMatch(), comTranslateMinMax(), comTranslateParens(), comTranslateParent(), comTranslatePhrasequotes(), comTranslatePredicate(), comTranslatePrint(), comTranslatePts(), comTranslateQuotes(), comTranslateStartStop(), comTranslateSubsumes(), comTranslateTerm(), comTranslateTopPeek(), comTranslateUnder(), comTranslateUnEquation(), comWriteDeclarations(), comWriteFinitFunction(), comWriteFunctions(), comWriteHeader(), and comWriteInitFunction().

5.5.5.40 int comRegisterString (String *string*)

register a string to be allocated statically later returns the index in strings Definition at line 1272 of file compile.c.

References com, and CompilerStruct::strings.

Referenced by comTranslateString().

5.5.5.41 ReturnType comReturnTypeOfFormula (Formula *formula*)

check the return type of a formula Definition at line 4477 of file compile.c.

References comFormulaTypeToString(), comReturnTypeOfPredicate(), comReturnTypeOfTerm(), comReturnTypeToString(), comWriteWarning(), ReturnType, RTBoolean, RTError, RTLexemNode, RTLexemPosition, RTNoError, RTNumber, and RTPeek.

Referenced by comTranslateFormula().

5.5.5.42 ReturnType comReturnTypeOfFunction (String *functor*, List *args*)

check the return type of a function Definition at line 4137 of file compile.c.

References comReturnTypeOfTerm(), comReturnTypeToString(), comWriteError(), comWriteWarning(), FALSE, NULL, ReturnType, RTError, RTLexemNode, RTLexemPosition, RTList, RTNoError, RTNumber, RTPeek, and RTString.

Referenced by comReturnTypeOfTerm().

5.5.5.43 ReturnType comReturnTypeOfPredicate (String *functor*, List *args*)

check the return type of a predicate Definition at line 3820 of file compile.c.

References comReturnTypeOfTerm(), comReturnTypeToString(), comWriteError(), comWriteWarning(), NULL, ReturnType, RTBoolean, RTError, RTLexemNode, RTLexemPosition, RTNoError, RTNumber, RTPeek, and RTString.

Referenced by comReturnTypeOfFormula().

5.5.5.44 ReturnType comReturnTypeOfTerm (Term *term*)

check the return type of a term Definition at line 4394 of file compile.c.

References comReturnTypeOfFunction(), comReturnTypeToString(), comTermTypeToString(), comWriteWarning(), NULL, ReturnType, RTAVNode, RTError, RTLexemNode, RTLexemPosition, RTNoError, RTNumber, RTPeek, and RTString.

Referenced by comReturnTypeOfFormula(), comReturnTypeOfFunction(), comReturnTypeOfPredicate(), comTranslateAbs(), comTranslateArithmetics(), comTranslateBetween(), comTranslateChunkHead(), comTranslateConnected(), comTranslateConstraint(), comTranslateDistance(), comTranslateEquation(), comTranslateGuard(), comTranslateHas(), comTranslateIs(), comTranslateLookup(), comTranslateMatch(), comTranslateMinMax(), comTranslateParens(), comTranslateParent(), comTranslatePhrasequotes(), comTranslatePrint(), comTranslateQuotes(), comTranslateStartStop(), comTranslateSubsumes(), comTranslateTerm(), comTranslateUnder(), and comTranslateUnEquation().

5.5.5.45 String comReturnTypeToString (ReturnType *returnType*)

string representation of a returntype Definition at line 479 of file compile.c.

References RTAVNode, RTBoolean, RTConjunction, RTDisjunction, RTError, RTGraphemNode, RTLexemNode, RTLexemPosition, RTList, RTNoError, RTNumber, RTPeek, and RTString.

Referenced by comReturnTypeOfFormula(), comReturnTypeOfFunction(), comReturnTypeOfPredicate(), comReturnTypeOfTerm(), comTranslateAbs(), comTranslateArithmetics(), comTranslateChunkHead(), comTranslateDistance(), comTranslateEquation(), comTranslateGuard(), comTranslateStartStop(), and comTranslateUnEquation().

5.5.5.46 int comTermDepth (Term *term*)

compute the number of variables needed to evaluate a term Definition at line 4871 of file compile.c.

References comFunctionDepth(), max, and NULL.

Referenced by comConstraintDepth(), comFormulaDepth(), comFunctionDepth(), and comPredicateDepth().

5.5.5.47 String comTermTypeToString (Term *term*)

string representation of a term type Definition at line 514 of file compile.c.

Referenced by comReturnTypeOfTerm().

5.5.5.48 Boolean comTranslate (void)

translate the current cdg to C Definition at line 3721 of file compile.c.

References CompilerStruct::ccFileName, CDG_INFO, cdgFlush(), cdgPrintf(), com, comAnalyzeGrammar(), comTranslateBinaryConstraints(), comTranslateUnaryConstraints(), comWriteDeclarations(), comWriteFunctions(), comWriteHeader(), and TRUE.

Referenced by comCompile().

5.5.5.49 void comTranslateAbs (List *args*, int *tmpIndex*)

translate the abs function Definition at line 1482 of file compile.c.

References comPrint(), comPrintln(), comReturnTypeOfTerm(), comReturnTypeToString(), comTranslateLexicalAccess(), comTranslateNumber(), comTranslateTerm(), comWriteError(), FALSE, ReturnType, RTNoError, RTNumber, RTPeek, and TRUE.

Referenced by comTranslateFunction().

5.5.5.50 void comTranslateArithmetics (Term *term*, int *tmpIndex*)

translate the arithmetic term operations Definition at line 2010 of file compile.c.

References comIndent(), comOutdent(), comPrint(), comPrintln(), comReturnTypeOfTerm(), comReturnTypeToString(), comTranslateLexicalAccess(), comTranslateNumber(), comTranslateTerm(), comWriteError(), FALSE, ReturnType, RTNoError, RTNumber, RTPeek, and TRUE.

Referenced by comTranslateTerm().

5.5.5.51 void comTranslateBetween (String *functor*, List *args*, int *tmpIndex*)

translate the 'between' predicate Definition at line 2634 of file compile.c.

References comPrint(), comPrintln(), comReturnTypeOfTerm(), comTranslateLexemNodeAccess(), comTranslateNumber(), comTranslateString(), comTranslateTerm(), ReturnType, RTLexemNode, RTLexemPosition, RTNumber, RTString, and TRUE.

Referenced by comTranslatePredicate().

5.5.5.52 void comTranslateBinaryConstraints (void)

translate each binary constraint into a separate c-function Definition at line 3704 of file compile.c.

References com, comTranslateConstraint(), and CompilerStruct::indent.

Referenced by comTranslate().

5.5.5.53 void comTranslateBottomPeek (Term *term*, int *tmpIndex*)

translate a bottom peek Definition at line 2119 of file compile.c.

References comIndexOfVarInfo(), comPrint(), comPrintln(), comTranslateLexicalAccess(), and NULL.

Referenced by comTranslateTerm().

5.5.5.54 void comTranslateChunkHead (String *functor*, List *args*, int *tmpIndex*)

translate the chunk_head predicate Definition at line 2560 of file compile.c.

References comPrint(), comPrintln(), comReturnTypeOfTerm(), comReturnTypeToString(), comTranslateLexemNodeAccess(), comWriteError(), ReturnType, RTLexemNode, RTLexemPosition, and RTNoError.

Referenced by comTranslatePredicate().

5.5.5.55 void comTranslateConnected (String *functor*, List *args*, int *tmpIndex*)

translate the 'connected' predicate Definition at line 2768 of file compile.c.

References com, comPrint(), comPrintln(), comReturnTypeOfTerm(), comTranslateLexemNodeAccess(), CompilerStruct::currentConstraint, ReturnType, RTLexemNode, and RTLexemPosition.

Referenced by comTranslatePredicate().

5.5.5.56 void comTranslateConnexion (Formula *formula*)

translate a connexion in case of the unsymmetric connexions 'Under' & 'Over' a distinction between the order (lv1, lv2) and (lv2, lv1) is made. in the other cases this doesn't matter. Definition at line 3563 of file compile.c.

References comConnextionToString(), comIndent(), comIndexOfVarInfo(), comOutdent(), and comPrintln().

Referenced by comTranslateFormula().

5.5.5.57 void comTranslateConstraint (Constraint *constraint*)

translate a constraint into a c-function Definition at line 3617 of file compile.c.

References com, comConnextionToString(), comDirectionToString(), comEscapeQuotes(), comIndent(), comIndexOfConstraint(), comOutdent(), comPrint(), comPrintln(), comReturnTypeOfTerm(), comTranslateFormula(), comTranslateLexicalAccess(), comTranslateNumber(), comTranslateTerm(), CompilerStruct::currentConstraint, FALSE, NULL, ReturnType, RTNoError, RTPeek, and TRUE.

Referenced by comTranslateBinaryConstraints(), and comTranslateUnaryConstraints().

5.5.5.58 void comTranslateDirection (Formula *formula*)

translate the direction formulas Definition at line 3406 of file compile.c.

References comDirectionToString(), comIndent(), comIndexOfVarInfo(), comOutdent(), comPrint(), comPrintln(), and comWriteError().

Referenced by comTranslateFormula().

5.5.5.59 void comTranslateDistance (List *args*, int *tmpIndex*)

translate the distance function Definition at line 1435 of file compile.c.

References comPrint(), comPrintln(), comReturnTypeOfTerm(), comReturnTypeToString(), comTranslateLexemNodeAccess(), comTranslateTerm(), comWriteError(), FALSE, ReturnType, RTLexemNode, RTLexemPosition, RTNoError, and TRUE.

Referenced by comTranslateFunction().

5.5.5.60 void comTranslateEquation (Formula *formula*, int *tmpIndex*)

translate the equal and not equal formulas Definition at line 3061 of file compile.c.

References com, comEscapeQuotes(), comIndent(), comOutdent(), comPrint(), comPrintln(), comReturnTypeOfTerm(), comReturnTypeToString(), comTranslateLexemNodeAccess(), comTranslateLexicalAccess(), comTranslateNumber(), comTranslateString(), comTranslateTerm(), comWriteError(), comWriteWarning(), CompilerStruct::currentConstraint, FALSE, ReturnType, RTLexemNode, RTLexemPosition, RTNoError, RTNumber, RTPeek, RTString, and TRUE.

Referenced by comTranslateFormula().

5.5.5.61 void comTranslateExists (List *args*)

translate the exists predicate Definition at line 2504 of file compile.c.

References comIndexOfVarInfo(), comPrint(), comPrintln(), and NULL.

Referenced by comTranslatePredicate().

5.5.5.62 void comTranslateFormula (Formula *formula*, int *tmpIndex*)

translate a formula to c code Definition at line 3459 of file compile.c.

References com, comFormulaDepth(), comFormulaTypeToString(), comIndent(), comOutdent(), comPrint(), comPrintln(), comReturnTypeOfFormula(), comTranslateConnexion(), comTranslateDirection(), comTranslateEquation(), comTranslatePredicate(), comTranslateUnEquation(), comWriteWarning(), CompilerStruct::currentFormula, ReturnType, RTBoolean, RTError, and RTNoError.

Referenced by comTranslateConstraint().

5.5.5.63 void comTranslateFunction (String *functor*, List *args*, int *tmpIndex*)

translate a function to c code Definition at line 1361 of file compile.c.

References comIndent(), comOutdent(), comPrint(), comPrintln(), comTranslateAbs(), comTranslateDistance(), comTranslateHeight(), comTranslateLookup(), comTranslateMatch(), comTranslateMinMax(), comTranslateParens(), comTranslateParent(), comTranslatePhrasequotes(), comTranslatePts(), comTranslateQuotes(), and comWriteError().

Referenced by comTranslateTerm().

5.5.5.64 void comTranslateGuard (String *functor*, List *args*, int *tmpIndex*)

translate the root, spec and nonspec guard-predicates Definition at line 2989 of file compile.c.

References comPrint(), comPrintln(), comReturnTypeOfTerm(), comReturnTypeToString(), comTranslateLexemNodeAccess(), comTranslateTerm(), comWriteError(), ReturnType, RTLexemNode, RTLexemPosition, RTNoError, and TRUE.

Referenced by comTranslatePredicate().

5.5.5.65 void comTranslateHas (String *functor*, List *args*, int *tmpIndex*)

translate the 'has' predicate Definition at line 2818 of file compile.c.

References com, comIndent(), comOutdent(), comPrint(), comPrintln(), comReturnTypeOfTerm(), comTranslateLexemNodeAccess(), comTranslateLexicalAccess(), comTranslateNumber(), comTranslateString(), comTranslateTerm(), CompilerStruct::currentFormula, FALSE, ReturnType, RTLexemPosition, RTPeek, RTString, and TRUE.

Referenced by comTranslatePredicate().

5.5.5.66 void comTranslateHeight (List *args*, int *tmpIndex*)

translate the 'height' function Definition at line 1681 of file compile.c.

References comPrint(), comPrintln(), comTranslateLexemNodeAccess(), comWriteError(), and NULL.

Referenced by comTranslateFunction().

5.5.5.67 void comTranslateIs (String *functor*, List *args*, int *tmpIndex*)

translate the 'is' predicate Definition at line 2715 of file compile.c.

References com, comPrint(), comPrintln(), comReturnTypeOfTerm(), comTranslateLexemNodeAccess(), comTranslateString(), comWriteWarning(), CompilerStruct::currentConstraint, ReturnType, RTLexemNode, and RTLexemPosition.

Referenced by comTranslatePredicate().

5.5.5.68 void comTranslateLexemNodeAccess (Term *term*, int *tmpIndex*)

translate a ^id and @id Definition at line 1292 of file compile.c.

References comIndexOfVarInfo(), comPrint(), and comWriteError().

Referenced by comTranslateBetween(), comTranslateChunkHead(), comTranslateConnected(), comTranslateDistance(), comTranslateEquation(), comTranslateGuard(), comTranslateHas(), comTranslateHeight(), comTranslateIs(), comTranslateParens(), comTranslateParent(), comTranslatePhrasequotes(), comTranslatePts(), comTranslateQuotes(), comTranslateStartStop(), and comTranslateUnder().

5.5.5.69 void comTranslateLexicalAccess (Term *term*)

translate a lexical access Definition at line 1328 of file compile.c.

References comIndexOfVarInfo(), comPrint(), and comWriteError().

Referenced by comTranslateAbs(), comTranslateArithmetics(), comTranslateBottomPeek(), comTranslateConstraint(), comTranslateEquation(), comTranslateHas(), comTranslateLookup(), comTranslateMatch(), comTranslatePrint(), comTranslateSubsumes(), comTranslateTopPeek(), and comTranslateUnEquation().

5.5.5.70 void comTranslateLookup (List *args*, int *tmpIndex*)

translate the lookup function Definition at line 1536 of file compile.c.

References com, comEscapeQuotes(), comPrint(), comPrintln(), comReturnTypeOfTerm(), comTranslateLexicalAccess(), comTranslateString(), comTranslateTerm(), CompilerStruct::currentConstraint, FALSE, ReturnType, RTNoError, RTPeek, and RTString.

Referenced by comTranslateFunction().

5.5.5.71 void comTranslateMatch (List *args*, int *tmpIndex*)

translate the match function Definition at line 1763 of file compile.c.

References com, comEscapeQuotes(), comIndexOfHierarchy(), comPrint(), comPrintln(), comReturnTypeOfTerm(), comTranslateLexicalAccess(), comTranslateString(), comTranslateTerm(), comWriteError(), CompilerStruct::currentConstraint, FALSE, ReturnType, RTList, RTNoError, RTPeek, RTString, and TRUE.

Referenced by comTranslateFunction().

5.5.5.72 void comTranslateMinMax (String *functor*, List *args*, int *tmpIndex*)

translate the min and max function Definition at line 1708 of file compile.c.

References comPrint(), comPrintln(), comReturnTypeOfTerm(), comTranslateNumber(), comTranslateTerm(), FALSE, NULL, ReturnType, RTNoError, RTPeek, and TRUE.

Referenced by comTranslateFunction().

5.5.5.73 void comTranslateNumber (Term *term*, int *tmpIndex*)

translate a number access Definition at line 1902 of file compile.c.

References comPrint().

Referenced by comTranslateAbs(), comTranslateArithmetics(), comTranslateBetween(), comTranslateConstraint(), comTranslateEquation(), comTranslateHas(), comTranslateMinMax(), and comTranslateUnEquation().

5.5.5.74 void comTranslateParens (List *args*, int *tmpIndex*)

translate the parens function Definition at line 1610 of file compile.c.

References comPrint(), comPrintln(), comReturnTypeOfTerm(), comTranslateLexemNodeAccess(), ReturnType, and RTLexemPosition.

Referenced by comTranslateFunction().

5.5.5.75 void comTranslateParent (List *args*, int *tmpIndex*)

translate the parent function Definition at line 1634 of file compile.c.

References com, comPrint(), comPrintln(), comReturnTypeOfTerm(), comTranslateLexemNodeAccess(), CompilerStruct::currentConstraint, ReturnType, and RTLexemPosition.

Referenced by comTranslateFunction().

5.5.5.76 void comTranslatePhrasequotes (List *args*, int *tmpIndex*)

translate the phrasequotes function Definition at line 1512 of file compile.c.

References comPrint(), comPrintln(), comReturnTypeOfTerm(), comTranslateLexemNodeAccess(), ReturnType, and RTLexemPosition.

Referenced by comTranslateFunction().

5.5.5.77 void comTranslatePredicate (String *functor*, List *args*, int *tmpIndex*)

translate a predicate to c code Definition at line 2319 of file compile.c.

References comIndent(), comOutdent(), comPrint(), comPrintln(), comTranslateBetween(), comTranslateChunkHead(), comTranslateConnected(), comTranslateExists(), comTranslateGuard(), comTranslateHas(), comTranslateIs(), comTranslatePrint(), comTranslateStartStop(), comTranslateSubsumes(), and comTranslateUnder().

Referenced by comTranslateFormula().

5.5.5.78 void comTranslatePrint (List *args*, int *tmpIndex*)

translate the print predicate Definition at line 2294 of file compile.c.

References comPrint(), comPrintln(), comReturnTypeOfTerm(), comTranslateLexicalAccess(), comTranslateTerm(), FALSE, NULL, ReturnType, RTNoError, RTPeek, and TRUE.

Referenced by comTranslatePredicate().

5.5.5.79 void comTranslatePts (List *args*, int *tmpIndex*)

translate the pts function Definition at line 1662 of file compile.c.

References comPrint(), comPrintln(), and comTranslateLexemNodeAccess().

Referenced by comTranslateFunction().

5.5.5.80 void comTranslateQuotes (List *args*, int *tmpIndex*)

translate the quotes function Definition at line 1586 of file compile.c.

References comPrint(), comPrintln(), comReturnTypeOfTerm(), comTranslateLexemNodeAccess(), ReturnType, and RTLexemPosition.

Referenced by comTranslateFunction().

5.5.5.81 void comTranslateStartStop (String *functor*, List *args*, int *tmpIndex*)

translate the start and stop predicate Definition at line 3024 of file compile.c.

References comPrint(), comPrintln(), comReturnTypeOfTerm(), comReturnTypeToString(), comTranslateLexemNodeAccess(), comTranslateTerm(), comWriteError(), ReturnType, RTLexemNode, RTLexemPosition, RTNoError, and TRUE.

Referenced by comTranslatePredicate().

5.5.5.82 void comTranslateString (Term *term*, int *tmpIndex*)

translate a string access Definition at line 1916 of file compile.c.

References comIndexOfVarInfo(), comPrint(), and comRegisterString().

Referenced by comTranslateBetween(), comTranslateEquation(), comTranslateHas(), comTranslateIs(), comTranslateLookup(), comTranslateMatch(), and comTranslateSubsumes().

5.5.5.83 void comTranslateSubsumes (String *functor*, List *args*, int *tmpIndex*)

translate the subsumes and compatible predicates Definition at line 2390 of file compile.c.

References com, comEscapeQuotes(), comIndexOfHierarchy(), comPrint(), comPrintln(), comReturnTypeOfTerm(), comTranslateLexicalAccess(), comTranslateString(), comTranslateTerm(), comWriteError(), CompilerStruct::currentConstraint, ReturnType, RTNoError, RTPeek, RTString, and TRUE.

Referenced by comTranslatePredicate().

5.5.5.84 void comTranslateTerm (Term *term*, Boolean *insideFormula*, Boolean *needsSeparator*, int *tmpIndex*)

translate a term to c code Definition at line 1939 of file compile.c.

References comPrint(), comPrintln(), comReturnTypeOfTerm(), comTranslateArithmetics(), comTranslateBottomPeek(), comTranslateFunction(), comTranslateTopPeek(), FALSE, ReturnType, and RTNoError.

Referenced by comTranslateAbs(), comTranslateArithmetics(), comTranslateBetween(), comTranslateConstraint(), comTranslateDistance(), comTranslateEquation(), comTranslateGuard(), comTranslateHas(), comTranslateLookup(), comTranslateMatch(), comTranslateMinMax(), comTranslatePrint(), comTranslateStartStop(), comTranslateSubsumes(), and comTranslateUnEquation().

5.5.5.85 void comTranslateTopPeek (Term *term*, int *tmpIndex*)

translate a top peek Definition at line 2192 of file compile.c.

References comIndent(), comIndexOfVarInfo(), comOutdent(), comPrint(), comPrintln(), comTranslateLexicalAccess(), and NULL.

Referenced by comTranslateTerm().

5.5.5.86 void comTranslateUnaryConstraints (void)

translate each unary constraint into a separate c-function Definition at line 3600 of file compile.c.

References com, comTranslateConstraint(), and CompilerStruct::indent.

Referenced by comTranslate().

5.5.5.87 void comTranslateUnder (String *functor*, List *args*, int *tmpIndex*)

translate the 'under' predicate Definition at line 2592 of file compile.c.

References comPrint(), comPrintln(), comReturnTypeOfTerm(), comTranslateLexemNodeAccess(), comWriteError(), ReturnType, RTLexemNode, and RTNoError.

Referenced by comTranslatePredicate().

5.5.5.88 void comTranslateUnEquation (Formula *formula*, int *tmpIndex*)

translate the <, <=, >, >= formulas Definition at line 3289 of file compile.c.

References com, comEscapeQuotes(), comIndent(), comOutdent(), comPrint(), comPrintln(), comReturnTypeOfTerm(), comReturnTypeToString(), comTranslateLexicalAccess(), comTranslateNumber(), comTranslateTerm(), comWriteError(), CompilerStruct::currentConstraint, ReturnType, RTNoError, RTNumber, RTPeek, and TRUE.

Referenced by comTranslateFormula().

5.5.5.89 String comValueTypeToString (Value *value*)

string representation of a value type Definition at line 560 of file compile.c.

5.5.5.90 void comWriteDeclarations (void)

write declaration section Definition at line 650 of file compile.c.

References com, comIndent(), comOutdent(), comPrint(), comPrintln(), FINIT_GRAMMAR, INIT_GRAMMAR, CompilerStruct::maxValues, and NULL.

Referenced by comTranslate().

5.5.5.91 void comWriteError (String *format*, ...)

write a preprocessor error Definition at line 440 of file compile.c.

References CompilerStruct::ccFile, com, comEscapeQuotes(), CompilerStruct::currentConstraint, CompilerStruct::needsIndent, and TRUE.

Referenced by comIndexOfConstraint(), comIndexOfHierarchy(), comReturnTypeOfFunction(), comReturnTypeOfPredicate(), comTranslateAbs(), comTranslateArithmetics(), comTranslateChunkHead(), comTranslateDirection(), comTranslateDistance(), comTranslateEquation(), comTranslateFunction(), comTranslateGuard(), comTranslateHeight(), comTranslateLexemNodeAccess(), comTranslateLexicalAccess(), comTranslateMatch(), comTranslateStartStop(), comTranslateSubsumes(), comTranslateUnder(), and comTranslateUnEquation().

5.5.5.92 void comWriteFinitFunction (void)

write the grammar finalization function Definition at line 1086 of file compile.c.

References com, comIndent(), comOutdent(), comPrintln(), FINIT_GRAMMAR, and CompilerStruct::strings.

Referenced by comWriteFunctions().

5.5.5.93 void comWriteFunctions (void)

write helper functions Definition at line 755 of file compile.c.

References com, comIndent(), comOutdent(), comPrintln(), comWriteFinitFunction(), comWriteInitFunction(), and CompilerStruct::indent.

Referenced by comTranslate().

5.5.5.94 void comWriteHeader (void)

write header Definition at line 612 of file compile.c.

References comPrintln(), and NULL.

Referenced by comTranslate().

5.5.5.95 void comWriteInitFunction (void)

write the grammar initialization function Definition at line 1122 of file compile.c.

References com, comEscapeQuotes(), comIndent(), comOutdent(), comPrintln(), INIT_GRAMMAR, CompilerStruct::maxLookupStrings, NULL, and CompilerStruct::strings.

Referenced by comWriteFunctions().

5.5.5.96 void comWriteWarning (String *format, ...*)

write a preprocessor warning Definition at line 418 of file compile.c.

References CompilerStruct::ccFile, com, comEscapeQuotes(), CompilerStruct::currentConstraint, CompilerStruct::needsIndent, and TRUE.

Referenced by comReturnTypeOfFormula(), comReturnTypeOfFunction(), comReturnTypeOfPredicate(), comReturnTypeOfTerm(), comTranslateEquation(), comTranslateFormula(), and comTranslateIs().

5.5.6 Variable Documentation

5.5.6.1 Compiler com [static]

this is allocated on every call to comCompile Definition at line 132 of file compile.c.

Referenced by comAnalyzeGrammar(), comCompile(), comIndent(), comIndexOfVarInfo(), comLoad(), comMake(), comOutdent(), comPrint(), comPrintln(), comRegisterString(), comTranslate(), comTranslateBinaryConstraints(), comTranslateConnected(), comTranslateConstraint(), comTranslateEquation(), comTranslateFormula(), comTranslateHas(), comTranslateIs(), comTranslateLookup(), comTranslateMatch(), comTranslateParent(), comTranslateSubsumes(), comTranslateUnaryConstraints(), comTranslateUnEquation(), comWriteDeclarations(), comWriteError(), comWriteFinitFunction(), comWriteFunctions(), comWriteInitFunction(), and comWriteWarning().

5.5.6.2 MakeInfo makeInfo [static]

this is allocated once on comInitialize Definition at line 133 of file compile.c.

Referenced by comCompile(), comFinalize(), comInitialize(), and comMake().

5.6 Constraintnet - maintainance of constraint nets

5.6.1 Detailed Description

Author:
Ingo Schroeder

Date:
6/3/97

Data Structures

- struct ConstraintEdgeStruct
- struct ConstraintNetStruct
- struct ConstraintNodeStruct
- struct ConstraintViolationStruct
- struct NodeBindingStruct

Typedefs

- typedef ConstraintEdgeStruct * ConstraintEdge
- typedef ConstraintEdgeStruct ConstraintEdgeStruct
- typedef ConstraintNetStruct * ConstraintNet
- typedef ConstraintNodeStruct * ConstraintNode
- typedef ConstraintViolationStruct * ConstraintViolation
- typedef NodeBindingStruct * NodeBinding

Enumerations

- enum CnEdgesType { **cnEdgesOn**, **cnEdgesOff**, **cnEdgesFew**, **cnEdgesAll** }

Functions

- ConstraintNet cnBuild (Lattice lat, Boolean buildLVs)
- void cnBuildEdges (ConstraintNet net)
- ConstraintNet cnBuildFinal (ConstraintNet net, Boolean buildLVs)
- ConstraintNet cnBuildInit ()
- Boolean cnBuildIter (ConstraintNet net, GraphemNode gn, Boolean buildLVs)
- void cnBuildLevelValues (ConstraintNode node, Level level, GraphemNode modifier, GraphemNode modifiee)
- void cnBuildLv (ConstraintNode node, List modifiers, Level level, String label, List modifiees)
- Boolean cnBuildNodes (ConstraintNet net, Boolean buildLVs)
- Boolean cnBuildTriple (ConstraintNet net, int a, int b, int levelno)
- Boolean cnBuildUpdateArcs (ConstraintNet net, List listArcs)
- void cnCallback (String name, float *var)
- Boolean cnCompareViolation (ConstraintViolation a, ConstraintViolation b)
- Boolean cnConnectedByArc (ConstraintNode a, ConstraintNode b)
- void cnDelete (ConstraintNet net)
- void cnDeleteAllLVs (ConstraintNet net)

- void cnDeleteBinding (NodeBinding nb)
- void cnDeleteEdge (ConstraintEdge edge)
- void cnDeleteNode (ConstraintNode node)
- ConstraintNet cnFindNet (String id)
- ConstraintNode cnFindNode (ConstraintNet net, LevelValue lv)
- GraphemNode cnGetGraphemNodeFromArc (ConstraintNet net, Arc arc)
- Lattice cnGetLattice (ConstraintNet cn)
- void cnInitialize ()
- Boolean cnIsEndNode (ConstraintNode n)
- Boolean cnIsStartNode (ConstraintNode n)
- Boolean cnNodeComparePrio (ConstraintNode a, ConstraintNode b)
- Boolean cnNodeCompareSmallest (ConstraintNode a, ConstraintNode b)
- int cnOptimizeNet (ConstraintNet net)
- int cnOptimizeNode (ConstraintNet net, ConstraintNode node)
- void cnPrint (long unsigned int mode, ConstraintNet net)
- void cnPrintActiveLVs (ConstraintNet net)
- void cnPrintEdge (long unsigned int mode, ConstraintEdge e)
- void cnPrintInfo (ConstraintNet net)
- void cnPrintNode (long unsigned int mode, ConstraintNode cn)
- void cnPrintParses (ConstraintNet net)
- Boolean cnRenew (ConstraintNet net)
- void cnSortLVs (ConstraintNet net)
- void cnSortNodes (ConstraintNet net)
- Boolean cnTag (ConstraintNet net, Lattice lat)
- void cnUnaryPruning (ConstraintNode node)
- Boolean cnUnaryPruningCompare (LevelValue a, LevelValue b)
- void cnUndeleteAllLVs (ConstraintNet net)
- int countValidValues (ConstraintNet net)
- void cvAnalyse (ConstraintViolation cv, Vector context)
- ConstraintViolation cvClone (ConstraintViolation cv)
- Boolean cvCompare (ConstraintViolation a, ConstraintViolation b)
- Boolean cvCompareNatural (ConstraintViolation a, ConstraintViolation b)
- Boolean cvContains (List conflicts, ConstraintViolation cv)
- void cvDelete (ConstraintViolation cv)
- ConstraintViolation cvNew (Constraint c, LevelValue lva, LevelValue lvb)
- void cvPrint (unsigned long mode, ConstraintViolation cv)

Variables

- int cnCounter
- int cnCounter = 0
- CnEdgesType cnEdgesFlag
- CnEdgesType cnEdgesFlag = cnEdgesOff
- ConstraintNet cnMostRecentlyCreatedNet
- ConstraintNet cnMostRecentlyCreatedNet = NULL
- Boolean cnShowDeletedFlag
- Boolean cnShowDeletedFlag = FALSE
- int cnSortNodesMethod
- int cnSortNodesMethod = 0
- Number cnUnaryPruningFraction
- Number cnUnaryPruningFraction = 1.0
- Boolean cnUseNonSpec
- Boolean cnUseNonSpec = FALSE

5.6.2 Typedef Documentation

5.6.2.1 typedef ConstraintEdgeStruct* ConstraintEdge

Pointer to the ConstraintEdgeStruct Definition at line 125 of file constraintnet.h.

Referenced by cmdEdges(), cnBuildEdges(), cnDelete(), cnDeleteEdge(), and cnPrintEdge().

5.6.2.2 typedef struct ConstraintEdgeStruct ConstraintEdgeStruct

Models an edge between the two constraint nodes **start** and **stop**. These two fields are shallow copies of the nodes in the corresponding constraint net.

5.6.2.3 typedef ConstraintNetStruct* ConstraintNet

Pointer to the ConstraintNetStruct Definition at line 74 of file constraintnet.h.

Referenced by cdgDeleteComputed(), cmdDistance(), cmdEdges(), cmdISearch(), cmdNet(), cmdNetdelete(), cmdNetsearch(), cmdNewnet(), cmdPrintParses(), cmdRenewnet(), cmdWriteAnno(), cmdWriteNet(), cmdWriteParses(), cnBuild(), cnBuildEdges(), cnBuildFinal(), cnBuildInit(), cnBuildIter(), cnBuildLevelValues(), cnBuildLv(), cnBuildNodes(), cnBuildTriple(), cnBuildUpdateArcs(), cnDelete(), cnDeleteAllLVs(), cnFindNet(), cnFindNode(), cnGetGraphemNodeFromArc(), cnGetLattice(), cnOptimizeNet(), cnOptimizeNode(), cnPrint(), cnPrintActiveLVs(), cnPrintInfo(), cnPrintParses(), cnRenew(), cnSortLVs(), cnSortNodes(), cnTag(), cnUndeleteAllLVs(), comApprove(), comCompareAllLvPairs(), comCompareAllLvs(), comCompareNets(), comCompareWithContext(), comFindComparableLv(), countValidValues(), evalBinary(), evalBinaryConstraint(), evalConstraint(), evalUnary(), and evalUnaryConstraint().

5.6.2.4 typedef ConstraintNodeStruct* ConstraintNode

Pointer to the ConstraintNodeStruct Definition at line 99 of file constraintnet.h.

Referenced by cmdEdges(), cnBuildEdges(), cnBuildFinal(), cnBuildIter(), cnBuildLevelValues(), cnBuildLv(), cnBuildTriple(), cnBuildUpdateArcs(), cnConnectedByArc(), cnDelete(), cnDeleteNode(), cnFindNode(), cnIsEndNode(), cnIsStartNode(), cnNodeComparePrio(), cnNodeCompareSmallest(), cnOptimizeNet(), cnOptimizeNode(), cnPrint(), cnPrintActiveLVs(), cnPrintInfo(), cnPrintNode(), cnRenew(), cnSortLVs(), cnSortNodes(), cnUnaryPruning(), and comCompareNets().

5.6.2.5 typedef ConstraintViolationStruct* ConstraintViolation

Pointer to the ConstraintViolationStruct Definition at line 165 of file constraintnet.h.

Referenced by cnCompareViolation(), comCompareAllLvPairs(), comCompareWithContext(), cvAnalyse(), cvClone(), cvCompare(), cvCompareNatural(), cvContains(), cvDelete(), cvNew(), and cvPrint().

5.6.2.6 typedef NodeBindingStruct* NodeBinding

Pointer to the NodeBindingStruct Definition at line 138 of file constraintnet.h.

Referenced by cnDeleteBinding().

5.6.3 Enumeration Type Documentation

5.6.3.1 enum CnEdgesType

The types of a constraintnet edge Definition at line 33 of file constraintnet.h.

Referenced by cmdIncrementalCompletion().

5.6.4 Function Documentation

5.6.4.1 ConstraintNet cnBuild (Lattice *lat*, Boolean *buildLVs*)

Build a constraint net from LAT.

This function returns a new constraint net for a word graph. This function uses **cnBuildInit()**, **cnBuildNodes()**, and **cnBuildFinal()**. The resulting net contains no edges. The function performs these initializations:

- **id** is set to **net**<**cnCounter**>
- the **lexemgraph** is built
- **state** is set to **NSCreated**

If BUILDLVS is set, the nodes in the constraint net will be filled with LVs, otherwise the net will contain only constraint nodes, no LVs. Definition at line 250 of file constraintnet.c.

References CDG_WARNING, cdgCtrlCTrapped, cdgPrintf(), cnBuildFinal(), cnBuildInit(), cnBuildNodes(), cnDelete(), cnMostRecentlyCreatedNet, cnTag(), ConstraintNet, and NULL.

Referenced by cmdNewnet(), and comApprove().

5.6.4.2 void cnBuildEdges (ConstraintNet *net*)

builds edges in a constraint net

This function computes all edges in a constraint net:

- The Vector **edges** is allocated.
- A constraint edge is built for every pair of constraint nodes and inserted into **edges**.
- The fields **isMarked** and **scores** are allocated for each edge.
- All pairs of LVs from the two constraint nodes are evaluated jointly and the result is store in the matrix **scores**. The result will be$\sim$0 if the LVs are no **lvCompatible()**, otherwise it is the product of the combined binary score and the two unary scores.
- A mapping from all edges to their reverses is computed and stored in the field **reverse**.

C-c interrupts this function, deletes all partial results, and displays the total time elapsed as a **CDG_PROFILE** message. Definition at line 1328 of file constraintnet.c.

References CDG_DEBUG, CDG_PROFILE, cdgCtrlCTrapped, cdgFlush(), cdgPrintf(), cdgXCDG, cnConnectedByArc(), cnEdgesFlag, ConstraintEdge, ConstraintNet, ConstraintNode, ConstraintNetStruct::edges, evalBinary(), FALSE, ConstraintEdgeStruct::isMarked, ConstraintNodeStruct::level,

ConstraintNetStruct::lexemgraph, ConstraintNetStruct::nodes, LexemGraphStruct::nodes, NULL, ConstraintEdgeStruct::reverse, ConstraintEdgeStruct::scores, smDelete(), smNew(), smSetFlag(), smSetScore(), ConstraintEdgeStruct::start, ConstraintEdgeStruct::stop, Timer, timerElapsed(), timerFree(), timerNew(), TRUE, and ConstraintNodeStruct::values.

Referenced by cnBuildFinal().

5.6.4.3 ConstraintNet cnBuildFinal (ConstraintNet *net*, Boolean *buildLVs*)

Final improvements: optimize, sort, unary pruning, score cache and edges

This function performs various clean-up operations on a net for which all constraint nodes have been built:

- It removes unnecessary structures from the net using **cnOptimizeNet()**.
- If **cnSortNodes** is set, it sorts the constraint nodes using **cnSortNodes()**.
- It applies **cnUnaryPruning()** to each constraint node.
- If **scUseCache** is set, it initializes **net->cache** to a new cache returned by **scNew()**.
- If **cnEdgesFlag** is not **cnEdgesOff**, it applies **cnBuildEdges()** to build the edges of the constraint net.

The function returns **FALSE** iff any of the subsidiary functions returned **FALSE**. Definition at line 163 of file constraintnet.c.

References ConstraintNetStruct::cache, CDG_WARNING, cdgCtrlCAllowed, cdgCtrlCTrapped, cdgPrintf(), cnBuildEdges(), cnDelete(), cnEdgesFlag, cnOptimizeNet(), cnSortLVs(), cnSortNodes(), cnSortNodesMethod, cnUnaryPruning(), cnUseNonSpec, ConstraintNet, ConstraintNode, ConstraintNetStruct::edges, FALSE, ConstraintNetStruct::isBuilt, ConstraintNetStruct::lexemgraph, LexemGraphStruct::max, max, LexemGraphStruct::min, ConstraintNetStruct::nodes, NULL, scNew(), scUseCache, and ConstraintNetStruct::values.

Referenced by cnBuild().

5.6.4.4 ConstraintNet cnBuildInit ()

This function returns a new ConstraintNet with a unique name, but with all fields set to meaningless default values. Building a complete constraint net is a multi-stage process that involves several of the other functions of this module. Definition at line 85 of file constraintnet.c.

References ConstraintNetStruct::cache, cnCounter, ConstraintNet, ConstraintNetStruct::edges, ConstraintNetStruct::evalBinary, ConstraintNetStruct::evalUnary, ConstraintNetStruct::id, ConstraintNetStruct::isBuilt, ConstraintNetStruct::lvTotals, ConstraintNetStruct::nodes, NULL, ConstraintNetStruct::parses, ConstraintNetStruct::searchagenda, ConstraintNetStruct::statUnary, ConstraintNetStruct::totalNumberOfValues, and ConstraintNetStruct::values.

Referenced by cnBuild().

5.6.4.5 Boolean cnBuildIter (ConstraintNet *net*, GraphemNode *gn*, Boolean *buildLVs*)

Builds the constraint node corresponding to GN in NET.

This function really performs most of the work that was documented under cnBuildNodes() for simplicity. Definition at line 781 of file constraintnet.c.

References cdgCtrlCTrapped, cdgFlush(), cnBuildLevelValues(), cnDeleteNode(), cnUseNonSpec, ConstraintNet, ConstraintNode, FALSE, ConstraintNodeStruct::gn, GraphemNode, LexemGraphStruct::graphemnodes, ConstraintNodeStruct::level, GraphemNodeStruct::lexemes, ConstraintNetStruct::lexemgraph, lgAreDeletedNodes(), ConstraintNodeStruct::net, ConstraintNetStruct::nodes, LexemGraphStruct::nodes, ConstraintNodeStruct::noValidValues, NULL, ConstraintNodeStruct::totalNumberOfValues, TRUE, and ConstraintNodeStruct::values.

Referenced by cnBuildNodes(), and cnBuildUpdateArcs().

5.6.4.6 void cnBuildLevelValues (ConstraintNode *node*, Level *level*, GraphemNode *modifier*, GraphemNode *modifiee*)

Builds all level values for LEVEL, MODIFIER and MODIFIEE.

This function builds all LVs that represent tuples composed from the parameters it receives. This function is used as the innermost loop by **cnBuildIter()**. Definition at line 652 of file constraintnet.c.

References GraphemNodeStruct::arc, cnBuildLv(), ConstraintNet, ConstraintNode, GraphemNode, ConstraintNetStruct::lexemgraph, lgMayModify(), lgPartitions(), ConstraintNodeStruct::net, and NULL.

Referenced by cnBuildIter(), cnBuildTriple(), and cnBuildUpdateArcs().

5.6.4.7 void cnBuildLv (ConstraintNode *node*, List *modifiers*, Level *level*, String *label*, List *modifiees*)

Build a new levelvalue in NODE.

This function creates exactly one LV with the specified fields using **lvNew()** and stores it in **node**, incrementing all relevant counters properly. Definition at line 613 of file constraintnet.c.

References CDG_DEBUG, cdgPrintf(), ConstraintNet, ConstraintNode, evalUnary(), FALSE, ConstraintNodeStruct::net, NULL, ConstraintNodeStruct::totalNumberOfValues, ConstraintNetStruct::totalNumberOfValues, ConstraintNetStruct::values, and ConstraintNodeStruct::values.

Referenced by cnBuildLevelValues().

5.6.4.8 Boolean cnBuildNodes (ConstraintNet *net*, Boolean *buildLVs*)

Builds the constraint nodes of NET. If BUILDLVS is set, the nodes are immediately filled with all possible LVs, otherwise they remain empty.

Returns FALSE if the constraintnet is invalid.

Basically it performs the following steps:

- allocates the Vectors **nodes** and **values**
- partitions the set of lexeme nodes created from each word hypothesis according to each level by using **lgPartitions()**
- allocates a **ConstraintNode** for each of the partitions *k* and inserts it into the Vector **nodes**
- checks whether the subordination *(k, l, m)* is possible for each triples of modifier set, label and modifiee set, and constructs the corresponding LV
- checks whether the subordination *(k, l,* **NIL***)* is possible for each pair of modifier set and label, and constructs the corresponding LV

- inserts all new LVs into the respective constraint nodes and the Vector **values**
- sorts the LVs in each constraint node by their limit.

However, some complications apply:

- Under **CDG_DEBUG**, each word in the word graph is printed as it is used to build LVs.
- If a level has its **useflag** reset, it is ignored completely.
- Some of the LVs created may be destroyed again by **cnUnaryPruning()** if the variable **cnUnaryPruningFraction** is smaller than∼1. Such LVs are not stored in the constraint node nor in the constraint net.
- Each iteration executes the hook **HOOK_CNBUILDNODES**.
- If **cnSortNodes** is set, **cnSortNodes()** is called after building all nodes.
- If **scUseCache** is set, a new cache is allocated for the constraint net.
- The time elapsed is printed as a **CDG_PROFILE** message.
- This function is interruptible by **C-c** in much the same way as **cnBuildEdges()**.

Definition at line 895 of file constraintnet.c.

References CDG_DEBUG, CDG_HOOK, CDG_PROFILE, cdgExecHook(), cdgPrintf(), cnBuildIter(), ConstraintNet, GraphemNode, LexemGraphStruct::graphemnodes, hkVerbosity, HOOK_CNBUILDNODES, ConstraintNetStruct::isBuilt, GraphemNodeStruct::lexemes, ConstraintNetStruct::lexemgraph, LexemNode, LexemGraphStruct::max, ConstraintNetStruct::nodes, LexemGraphStruct::nodes, NULL, Timer, timerElapsed(), timerFree(), timerNew(), TRUE, and ConstraintNetStruct::values.

Referenced by cnBuild().

5.6.4.9 Boolean cnBuildTriple (ConstraintNet *net*, int *a*, int *b*, int *levelno*)

Build all LVs on LEVEL for the pair of time points (A,B) in NET.

All LVs that connect a word that starts at time point A as a modifier to a word that starts at time point B are built and inserted into the constraint net at the appropriate places. B == -1 means NIL, B == -2 means NONSPEC.

Returns FALSE if such LVs have already been built.

This function has nothing to do with incremental processing. It is intended for use by parsing algorithms that do not want the entire set of LVs built before they can start working, although the entire input is known. Definition at line 718 of file constraintnet.c.

References GraphemNodeStruct::arc, cnBuildLevelValues(), ConstraintNet, ConstraintNode, FALSE, ConstraintNodeStruct::gn, GraphemNode, LexemGraphStruct::graphemnodes, ConstraintNetStruct::isBuilt, ConstraintNodeStruct::level, ConstraintNetStruct::lexemgraph, LexemGraphStruct::max, ConstraintNetStruct::nodes, ConstraintNodeStruct::noValidValues, NULL, ConstraintNodeStruct::totalNumberOfValues, TRUE, and ConstraintNodeStruct::values.

5.6.4.10 Boolean cnBuildUpdateArcs (ConstraintNet *net*, List *listArcs*)

Update NET with the arcs in LISTARCS.

This function is used by **incrementalcompletion** to extend an existing constraint net by the structures corresponding to the specified **Arc** structures. Definition at line 2100 of file constraintnet.c.

References CDG_DEBUG, cdgPrintf(), cnBuildIter(), cnBuildLevelValues(), cnGetGraphemNodeFromArc(), cnPrintNode(), ConstraintNet, ConstraintNode, FALSE, ConstraintNodeStruct::gn, GraphemNode, ConstraintNodeStruct::level, GraphemNodeStruct::lexemes, ConstraintNetStruct::nodes, ConstraintNodeStruct::noValidValues, NULL, ConstraintNodeStruct::totalNumberOfValues, TRUE, and ConstraintNodeStruct::values.

5.6.4.11 void cnCallback (String *name*, float * *var*)

Callback function for cnUnaryPruningFraction.

This function is used as the callback function for the CDG variable **unaryFraction**. It prints a notification of the change to the CDG shell. Definition at line 2171 of file constraintnet.c.

References CDG_INFO, and cdgPrintf().

Referenced by cnInitialize().

5.6.4.12 Boolean cnCompareViolation (ConstraintViolation *a*, ConstraintViolation *b*)

compares two violations by penalty, then by domain index This function compares two structures of type **ConstraintViolation**, comparing first the penalty of the violation, after that the fields **nodeBindingIndex1** and **nodeBindingIndex2** and finally the names of the constraints.

TODO: this function is never used, see cvCompare for a similar function Definition at line 1830 of file constraintnet.c.

References ConstraintViolationStruct::constraint, ConstraintViolation, FALSE, ConstraintViolationStruct::nodeBindingIndex1, ConstraintViolationStruct::nodeBindingIndex2, ConstraintViolationStruct::penalty, and TRUE.

5.6.4.13 Boolean cnConnectedByArc (ConstraintNode *a*, ConstraintNode *b*)

Are two constraint nodes connected by an arc? This function checks whether two constraint nodes should be connected by an edge or not. This check is always performed before allocating a constraint edge. Two nodes fail this test if they bind the same lexeme and belong to the same level.

Think it over which nodes are connected by an arc. Do we need arcs in both directions?

return ((a->lexemnode == b->lexemnode && a->level != b->level) || (a->level == b->level && lgDistanceOfNodes (a->lexemnode->lexemgraph, a->lexemnode, b->lexemnode) != 0)); Definition at line 1216 of file constraintnet.c.

References ConstraintNode, ConstraintNodeStruct::gn, and ConstraintNodeStruct::level.

Referenced by cnBuildEdges().

5.6.4.14 void cnDelete (ConstraintNet *net*)

deletes constraint net

This function deallocates an entire constraint net. Note that while **cnBuild()** only allocates a few fields, this function allocates everything. The following functions are used for the purpose:

- **lgDelete()** for the **lexemgraph**
- **cnDeleteNode()** for the elements of **nodes**
- **cnDeleteEdge()** for the elements of **edges**
- **agDelete()** for the **searchagenda**
- **deleteParse()** for the elements of **parses**
- **scDelete()** for the **cache**

If **net** is identical to **cnMostRecentlyCreatedNet**, that variable is reset. Definition at line 1640 of file constraintnet.c.

References ConstraintNetStruct::cache, CDG_WARNING, cdgFreeString(), cdgPrintf(), cnDeleteEdge(), cnDeleteNode(), cnMostRecentlyCreatedNet, ConstraintEdge, ConstraintNet, ConstraintNode, ConstraintNetStruct::edges, ConstraintNetStruct::id, ConstraintNetStruct::lexemgraph, lgDelete(), ConstraintNetStruct::lvTotals, ConstraintNetStruct::nodes, NULL, ConstraintNetStruct::parses, scDelete(), ConstraintNetStruct::searchagenda, and ConstraintNetStruct::values.

Referenced by cdgDeleteComputed(), cmdNetdelete(), cnBuild(), cnBuildFinal(), cnTag(), and comApprove().

5.6.4.15 void cnDeleteAllLVs (ConstraintNet *net*)

delete all levelvalues in a constraint net

This function sets the field **isDeleted** for all LVs in the specified constraint net. Definition at line 2083 of file constraintnet.c.

References ConstraintNet, TRUE, and ConstraintNetStruct::values.

5.6.4.16 void cnDeleteBinding (NodeBinding *nb*)

cnDeleteBinding

This function deallocates **NodeBinding** structure. Both components of the pair are shallow copies and cannot be deallocated. Definition at line 1484 of file constraintnet.c.

References NodeBinding.

5.6.4.17 void cnDeleteEdge (ConstraintEdge *cn*)

deletes a constraint-edge

This function deallocates a constraint edge. Apart from the **ConstraintEdgeStruct** itself, only the field **scores** is deallocated by calling **smDelete()**. Definition at line 1615 of file constraintnet.c.

References ConstraintEdge, ConstraintEdgeStruct::isMarked, ConstraintEdgeStruct::scores, and smDelete().

Referenced by cnDelete().

5.6.4.18 void cnDeleteNode (ConstraintNode *cn*)

deletes a constraint-node

This function deallocates a single constraint node and all LVs contained in it. Note that pointers to these LVs may remain in the field **values** of the enclosing constraint net, so **cnDeleteNode()** should only be called immediately before deleting the net itself. Definition at line 1593 of file constraintnet.c.

References ConstraintNode, and ConstraintNodeStruct::values.

Referenced by cnBuildIter(), and cnDelete().

5.6.4.19 ConstraintNet cnFindNet (String *id*)

Looks for a constraint net with id ID and return it or NULL if it can't find the net in inputCurrentGrammar.

Returns:
the net with the specified **id** in the **inputCurrentGrammar** structure, or **NULL**.

Definition at line 2031 of file constraintnet.c.

References cdgNets, and ConstraintNet.

Referenced by cmdDistance(), cmdPrintParses(), cmdRenewnet(), and cmdWriteParses().

5.6.4.20 ConstraintNode cnFindNode (ConstraintNet *net*, LevelValue *lv*)

Find ConstraintNode of an LV. This finds LVs by comparing their IWRT numbers, so cannot give meaningful results if lv was not originally built for net.

Returns:
the constraint node in **net** that holds **lv** (or **NULL**).

Definition at line 1881 of file constraintnet.c.

References CDG_WARNING, cdgPrintf(), ConstraintNet, ConstraintNode, ConstraintNetStruct::nodes, NULL, and ConstraintNodeStruct::values.

5.6.4.21 GraphemNode cnGetGraphemNodeFromArc (ConstraintNet *net*, Arc *arc*)

Return the graphem node in NET that points to ARC. Definition at line 2149 of file constraintnet.c.

References GraphemNodeStruct::arc, ConstraintNet, GraphemNode, LexemGraphStruct::graphemnodes, ConstraintNetStruct::lexemgraph, and NULL.

Referenced by cnBuildUpdateArcs().

5.6.4.22 Lattice cnGetLattice (ConstraintNet *cn*)

Needed by XCDG because it can't talk to LexemGraphs directly.

This function simply returns **cn->lexemgraph->lattice**. It exists because XCDG needs that field, and XCDG cannot talk directly to lexeme graphs (they contain arrays of long long ints, which SWIG doesn't handle correctly). Definition at line 2204 of file constraintnet.c.

References ConstraintNet, LexemGraphStruct::lattice, and ConstraintNetStruct::lexemgraph.

5.6.4.23 void cnInitialize ()

Initialize the module constraintnet.

This function initializes the module Constraintnet - maintainance of constraint nets. It merely registers the module's CDG variables. Definition at line 2185 of file constraintnet.c.

References cnCallback(), cnEdgesFlag, cnShowDeletedFlag, cnSortNodesMethod, cnUnaryPruningFraction, cnUseNonSpec, and NULL.

Referenced by cdgInitialize().

5.6.4.24 Boolean cnIsEndNode (ConstraintNode *n*)

Does this node bind the latest lexeme in the lattice? The functions **lgIsStartNode()** and **lgIsEndNode()** are used for this purpose. Definition at line 1471 of file constraintnet.c.

References ConstraintNode, ConstraintNodeStruct::gn, ConstraintNodeStruct::level, and lgIsEndNode().

5.6.4.25 Boolean cnIsStartNode (ConstraintNode *n*)

Does this node bind the earliest lexeme in the lattice? The functions **lgIsStartNode()** and **lgIsEndNode()** are used for this purpose. Definition at line 1459 of file constraintnet.c.

References ConstraintNode, ConstraintNodeStruct::gn, ConstraintNodeStruct::level, and lgIsStartNode().

5.6.4.26 Boolean cnNodeComparePrio (ConstraintNode *a*, ConstraintNode *b*)

Compare constraint nodes by the ->no of their levels. Definition at line 549 of file constraintnet.c.

References ConstraintNode, and ConstraintNodeStruct::level.

Referenced by cnSortNodes().

5.6.4.27 Boolean cnNodeCompareSmallest (ConstraintNode *a*, ConstraintNode *b*)

Comparison function for cnSortNodes() based on domain size.

This function is used by **cnSortNodes()** to compare two constraint nodes according to the value of their **totalNumberOfValues=** fields. It returns **TRUE** iff **a** has a lower value or the same values as **b**. Definition at line 562 of file constraintnet.c.

References ConstraintNode, and ConstraintNodeStruct::noValidValues.

Referenced by cnSortNodes().

5.6.4.28 int cnOptimizeNet (ConstraintNet *net*)

optimize constraint net by deleting lexemes and values

This function deletes lexeme nodes and LVs from a constraint net that cannot possibly appear in any solution. It uses several rules for deleting structures:

- An LV can be deleted if it binds a set of lexeme nodes that are all deleted.
- An LV can be deleted if is modifier and modifiee are incompatible.

- A lexeme node can be deleted if it it cannot be bound by any LV on one level.
- A lexeme can be deleted if there is no path through the lexeme graph in which it appears, and which is totally undeleted.

Since these conditions can trigger each other, the function **cnOptimizeNode()** is called repeatedly on each node in the constraint net until no progress has been made. The function returns the total number of changes returned by the calls to **cnOptimizeNode()**, or -1 if none of them did so.

Returns:
> 0 : we have changed the constraintnet
0 : no changes have been made
< 0 : the net is invalid

Definition at line 1168 of file constraintnet.c.

References CDG_DEBUG, cdgPrintf(), cnOptimizeNode(), ConstraintNet, ConstraintNode, countValidValues(), FALSE, ConstraintNetStruct::nodes, and TRUE.

Referenced by cnBuildFinal(), and cnRenew().

5.6.4.29 int cnOptimizeNode (ConstraintNet *net*, ConstraintNode *node*)

Optimize constraint node by deleting lexemes and values.

Returns:
> 0 : we have changed the constraintnode
0 : no changes have been made
< 0 : the node is invalid

This function serves to discard structures in a constraint node that cannot appear in any solution. It returns the number of deletion operations that it has performed, or -1 if an inconsistency was found. This function is repeatedly called by **cnOptimizeNet()**. Definition at line 943 of file constraintnet.c.

References GraphemNodeStruct::arc, CDG_DEBUG, CDG_WARNING, cdgPrintf(), ConstraintNet, ConstraintNode, FALSE, ConstraintNodeStruct::gn, GraphemNode, ConstraintNodeStruct::level, GraphemNodeStruct::lexemes, ConstraintNetStruct::lexemgraph, LexemNode, lgAreDeletableNodes(), lgAreDeletedNodes(), lgCompatibleNodes(), lgDeleteNode(), lgDeleteNodes(), lgIsDeletedNode(), lgPrintNode(), GraphemNodeStruct::no, LexemNodeStruct::no, LexemGraphStruct::nodes, LexemGraphStruct::noOfPathsFromStart, LexemGraphStruct::noOfPathsToEnd, ConstraintNodeStruct::noValidValues, NULL, TRUE, and ConstraintNodeStruct::values.

Referenced by cnOptimizeNet().

5.6.4.30 void cnPrint (long unsigned int *mode*, ConstraintNet *net*)

Print a constraint net.

This function displays a constraint net in textual form. Output is suppressed if **hkVerbosity** does not have the bit **mode** set. The function uses **cnPrintNode()** and **lvPrint()**. Constraint nodes from levels that have their **showflag** reset are skipped. Deleted LVs are only shown if **cnShowDeletedFlag** is set. Definition at line 291 of file constraintnet.c.

References cdgCtrlCTrapped, cdgPrintf(), chunkerPrintChunks(), LexemGraphStruct::chunks, cnPrintNode(), cnShowDeletedFlag, ConstraintNet, ConstraintNode, ConstraintNetStruct::edges, ConstraintNodeStruct::gn, ConstraintNetStruct::id, LexemGraphStruct::isDeletedNode, ConstraintNodeStruct::level,

GraphemNodeStruct::lexemes, ConstraintNetStruct::lexemgraph, lgAreDeletedNodes(), max, min, ConstraintNetStruct::nodes, LexemGraphStruct::noOfPaths, ConstraintNodeStruct::noValidValues, NULL, ConstraintNetStruct::parses, and ConstraintNodeStruct::values.

Referenced by cmdNet().

5.6.4.31 void cnPrintActiveLVs (ConstraintNet *net*)

prints the active levelvalues

This function applies **lvPrint()** to all LVs in the specified constraint net that are not deleted. Definition at line 2041 of file constraintnet.c.

References CDG_DEBUG, CDG_INFO, cdgPrintf(), ConstraintNet, ConstraintNode, LexemGraphStruct::isDeletedNode, ConstraintNetStruct::lexemgraph, ConstraintNetStruct::nodes, ConstraintNetStruct::values, and ConstraintNodeStruct::values.

5.6.4.32 void cnPrintEdge (long unsigned int *mode*, ConstraintEdge *e*)

Print a constraint edge.

This function displays a constraint edge and the associated matrix **scores**. It reacts to the display flag **mode** in the same way as **cnPrint()** and all other display functions. Definition at line 384 of file constraintnet.c.

References GraphemNodeStruct::arc, cdgPrintf(), ConstraintEdge, ConstraintNodeStruct::gn, ConstraintNodeStruct::level, NULL, ConstraintEdgeStruct::scores, smGetScore(), ConstraintEdgeStruct::start, ConstraintEdgeStruct::stop, and ConstraintNodeStruct::values.

Referenced by cmdEdges().

5.6.4.33 void cnPrintInfo (ConstraintNet *net*)

print out some information about this net

This function displays some general information about **net**. Apart from the fields of the structure themselves, the minimal, average, and maximal number of LVs per node is calculated and displayed. This function is called in various places to summarize briefly the state of a constraint net. Definition at line 1696 of file constraintnet.c.

References ConstraintNetStruct::cache, ScoreCacheStruct::capacity, CDG_INFO, CDG_WARNING, cdgPrintf(), ConstraintNet, ConstraintNode, ConstraintNetStruct::edges, ConstraintNetStruct::evalBinary, ConstraintNetStruct::evalUnary, ScoreCacheStruct::hits, hkVerbosity, ConstraintNetStruct::id, LexemGraphStruct::lattice, ConstraintNetStruct::lexemgraph, max, min, ConstraintNetStruct::nodes, ConstraintNodeStruct::noValidValues, NULL, ScoreCacheStruct::size, and ConstraintNetStruct::statUnary.

Referenced by cmdNetsearch(), cmdNewnet(), cmdPrintParses(), and cmdRenewnet().

5.6.4.34 void cnPrintNode (long unsigned int *mode*, ConstraintNode *cn*)

Print a constraint node.

This function displays a constraint node. A node of the level **LEVEL** binding the lexemes **das_1** and **das_2** from time span *(1,2)* would be displayed like this:

das_1/das_2(1-2)/LEVEL Definition at line 458 of file constraintnet.c.

References GraphemNodeStruct::arc, cdgPrintf(), ConstraintNode, ConstraintNodeStruct::gn, ConstraintNodeStruct::level, GraphemNodeStruct::lexemes, LexemNode, and NULL.

Referenced by cnBuildUpdateArcs(), cnPrint(), and cnSortNodes().

5.6.4.35 void cnPrintParses (ConstraintNet *net*)

prints all Parses of a net

This function applies **parsePrint()** to all entries of **net->parses**. Definition at line 1864 of file constraintnet.c.

References CDG_INFO, cdgPrintf(), ConstraintNet, NULL, and ConstraintNetStruct::parses.

Referenced by cmdNetsearch(), and cmdPrintParses().

5.6.4.36 Boolean cnRenew (ConstraintNet *net*)

Return a constraint net to untouched state

This function undoes all changes that have been made to a constraint net since it was built. In particular, it restores all deleted lexeme nodes and LVs to a constraint net. All parses of **net** are deallocated. This returns the net to the state that it was in immediately after being optimized. **TRUE** is returned only if at least one value remains for each pair of word and level. Definition at line 1247 of file constraintnet.c.

References ConstraintNetStruct::cache, cnOptimizeNet(), cnSortLVs(), cnUseNonSpec, ConstraintNet, ConstraintNode, FALSE, LexemGraphStruct::isDeletedNode, ConstraintNetStruct::lexemgraph, LexemNode, lgComputeDistances(), lgComputeNoOfPaths(), LexemNodeStruct::limit, LexemGraphStruct::nodes, ConstraintNetStruct::nodes, ConstraintNodeStruct::noValidValues, NULL, ConstraintNetStruct::parses, scDelete(), scNew(), scUseCache, TRUE, ConstraintNetStruct::values, and ConstraintNodeStruct::values.

Referenced by cmdRenewnet().

5.6.4.37 void cnSortLVs (ConstraintNet *net*)

re-sorts the LVs in each constraint node by limit rather than by score

This function sorts the Vectors **values=of** all constraint nodes of **net** using **lvCompare()**. Definition at line 1808 of file constraintnet.c.

References ConstraintNet, ConstraintNode, ConstraintNetStruct::nodes, and ConstraintNodeStruct::values.

Referenced by cnBuildFinal(), and cnRenew().

5.6.4.38 void cnSortNodes (ConstraintNet *net*)

Sort constraint nodes.

This function sorts the constraint nodes of **net** using the function **cnNodeCompare()**. Definition at line 573 of file constraintnet.c.

References CDG_DEBUG, cdgPrintf(), cnNodeComparePrio(), cnNodeCompareSmallest(), cnPrintNode(), cnSortNodesMethod, ConstraintNet, ConstraintNode, hkVerbosity, ConstraintNetStruct::nodes, and ConstraintNodeStruct::noValidValues.

Referenced by cnBuildFinal().

5.6.4.39 Boolean cnTag (ConstraintNet *net*, Lattice *lat*)

Build lexeme graph and add tagger and chunker information to NET. Definition at line 109 of file constraintnet.c.

References CDG_DEBUG, CDG_INFO, cdgPrintf(), Chunker, chunkerChunk(), chunkerDelete(), chunkerNew(), chunkerPrintChunks(), cnDelete(), ConstraintNet, DefaultChunker, FALSE, LexemGraphStruct::graphemnodes, hkVerbosity, ConstraintNetStruct::lexemgraph, lgNew(), LexemGraphStruct::max, LexemGraphStruct::min, LexemGraphStruct::nodes, LexemGraphStruct::noOfPaths, NULL, and TRUE.

Referenced by cnBuild().

5.6.4.40 void cnUnaryPruning (ConstraintNode *node*)

Remove a given percentage of values from a node.

This function finds the values with the worst scores from a constraint node and deletes them. Let *W* be the set of LVs in **node**. All elements of *W* are deleted whose score is smaller than the score of the *n*th element, where

n = (int) =|W| $*$ (1 - **cnUnaryPruningFraction**)

This function temporarily sorts the set W using the function **cnUnaryPruningCompare()**=. Definition at line 500 of file constraintnet.c.

References CDG_INFO, cdgPrintf(), cnUnaryPruningCompare(), cnUnaryPruningFraction, ConstraintNode, ConstraintNodeStruct::noValidValues, NULL, TRUE, and ConstraintNodeStruct::values.

Referenced by cnBuildFinal().

5.6.4.41 Boolean cnUnaryPruningCompare (LevelValue *a*, LevelValue *b*)

comparison function for cnUnaryPruning()

This function compares two LVs by their scores. It returns **TRUE** iff **a->score** < b->score. Definition at line 482 of file constraintnet.c.

Referenced by cnUnaryPruning().

5.6.4.42 void cnUndeleteAllLVs (ConstraintNet *net*)

undelete all levelvalues in a constraint net

This function resets the field **isDeleted** for all LVs in the specified constraint net. Definition at line 2066 of file constraintnet.c.

References ConstraintNet, FALSE, and ConstraintNetStruct::values.

5.6.4.43 int countValidValues (ConstraintNet *net*)

This function returns the number of undeleted LVs in **net**. It is a helper fo cnOptimizeNet Definition at line 1126 of file constraintnet.c.

References ConstraintNet, and ConstraintNetStruct::values.

Referenced by cnOptimizeNet().

5.6.4.44 void cvAnalyse (ConstraintViolation *cv*, Vector *context*)

Show what the conflict means. This function prints out the conflict itself, the LVs that actually cause it, the constraint that is violated, and the participating lexemes. Definition at line 1494 of file constraintnet.c.

References CDG_INFO, cdgPrintf(), ConstraintViolationStruct::constraint, ConstraintViolation, cvPrint(), evalBinaryConstraint(), LexemNodeStruct::lexem, LexemNode, ConstraintViolationStruct::lv1, ConstraintViolationStruct::lv2, and NULL.

5.6.4.45 ConstraintViolation cvClone (ConstraintViolation *cv*)

clone a constraint violation

Returns:
a clone of **cv**.

Definition at line 1793 of file constraintnet.c.

References ConstraintViolationStruct::constraint, ConstraintViolation, cvNew(), ConstraintViolationStruct::lv1, ConstraintViolationStruct::lv2, and ConstraintViolationStruct::penalty.

5.6.4.46 Boolean cvCompare (ConstraintViolation *a*, ConstraintViolation *b*)

Constraint violations should be sorted first by penalty, then by arity, finally by natural order.

This function compares two conflicts. It returns **TRUE**

- if **a** has the lower penalty
- otherwise, if **a** is unary and **b** is binary
- otherwise, if the first LV in **a** precedes the first lv in **b** according to natural order.

Definition at line 1992 of file constraintnet.c.

References ConstraintViolationStruct::constraint, ConstraintViolation, FALSE, ConstraintViolationStruct::lv1, ConstraintViolationStruct::lv2, ConstraintViolationStruct::penalty, and TRUE.

Referenced by comCompareAllLvPairs(), and comCompareWithContext().

5.6.4.47 Boolean cvCompareNatural (ConstraintViolation *a*, ConstraintViolation *b*)

compares two violations by natural order

This function compares two **ConstraintViolation=** structures by the position of the affected LVs. If both affect the same LVs, it compares them by the constraint name. Definition at line 1960 of file constraintnet.c.

References ConstraintViolationStruct::constraint, ConstraintViolation, FALSE, ConstraintViolationStruct::nodeBindingIndex1, ConstraintViolationStruct::nodeBindingIndex2, and TRUE.

5.6.4.48 Boolean cvContains (List *conflicts*, ConstraintViolation *cv*)

Does a conflict occur in a list?

This function checks whether a conflict equivalent to **cv=** appears in the List. **TRUE=** is returned if both the constraint and the fields **nodeBindingIndex1=** and **nodeBindingIndex2=** match (the penalty need not match). Definition at line 1933 of file constraintnet.c.

References ConstraintViolationStruct::constraint, ConstraintViolation, FALSE, ConstraintViolationStruct::nodeBindingIndex1, ConstraintViolationStruct::nodeBindingIndex2, and TRUE.

5.6.4.49 void cvDelete (ConstraintViolation *cv*)

cvDelete

This function deallocates a structure of type **ConstraintViolation**. Since all components of this type are shallow copies, only the structure itself is deallocated. Definition at line 1567 of file constraintnet.c.

References ConstraintViolation, ConstraintViolationStruct::lv1, and ConstraintViolationStruct::lv2.

Referenced by comCompareAllLvPairs(), and comCompareWithContext().

5.6.4.50 ConstraintViolation cvNew (Constraint *c*, LevelValue *lva*, LevelValue *lvb*)

Allocate a new constraint violation. This function allocates a new **ConstraintViolation**. The parameters are installed in the corresponding fields of the new structure. All fields of a **ConstraintViolation** are shallow copies. Definition at line 1756 of file constraintnet.c.

References ConstraintViolationStruct::constraint, ConstraintViolation, ConstraintViolationStruct::lv1, ConstraintViolationStruct::lv2, ConstraintViolationStruct::nodeBindingIndex1, ConstraintViolationStruct::nodeBindingIndex2, and ConstraintViolationStruct::penalty.

Referenced by cvClone(), evalBinary(), and evalUnary().

5.6.4.51 void cvPrint (unsigned long *mode*, ConstraintViolation *cv*)

Print a conflict.

This function displays a conflict using **cdgPrintf()**. If **width** is∼0, the constraint identifier is printed in full, otherwise it is truncated to **width** characters. Definition at line 1912 of file constraintnet.c.

References CDG_INFO, cdgPrintf(), ConstraintViolationStruct::constraint, ConstraintViolation, ConstraintViolationStruct::nodeBindingIndex1, ConstraintViolationStruct::nodeBindingIndex2, and ConstraintViolationStruct::penalty.

Referenced by cvAnalyse().

5.6.5 Variable Documentation

5.6.5.1 int cnCounter

Counts the constraint nets created so far and appears in the name of every constraint net. Definition at line 50 of file constraintnet.c.

Referenced by cnBuildInit().

5.6.5.2 int cnCounter = 0

Counts the constraint nets created so far and appears in the name of every constraint net. Definition at line 50 of file constraintnet.c.

Referenced by cnBuildInit().

5.6.5.3 CnEdgesType cnEdgesFlag

This variable implements the CDG variable edges. Definition at line 58 of file constraintnet.c.

Referenced by cmdIncrementalCompletion(), cmdStatus(), cnBuildEdges(), cnBuildFinal(), and cnInitialize().

5.6.5.4 CnEdgesType cnEdgesFlag = cnEdgesOff

This variable implements the CDG variable edges. Definition at line 58 of file constraintnet.c.

Referenced by cmdIncrementalCompletion(), cmdStatus(), cnBuildEdges(), cnBuildFinal(), and cnInitialize().

5.6.5.5 ConstraintNet cnMostRecentlyCreatedNet

cnMostRecentlyCreatedNet points to last constraint net created (or to NULL). This variable is used as an implicit argument to commands that expect the name of a constraint net. Definition at line 55 of file constraintnet.c.

Referenced by cdgDeleteComputed(), cmdISearch(), cmdNet(), cmdNetdelete(), cmdNetsearch(), cmdPrintParses(), cmdRenewnet(), cmdWriteAnno(), cmdWriteNet(), cmdWriteParses(), cnBuild(), and cnDelete().

5.6.5.6 ConstraintNet cnMostRecentlyCreatedNet = NULL

cnMostRecentlyCreatedNet points to last constraint net created (or to NULL). This variable is used as an implicit argument to commands that expect the name of a constraint net. Definition at line 55 of file constraintnet.c.

Referenced by cdgDeleteComputed(), cmdISearch(), cmdNet(), cmdNetdelete(), cmdNetsearch(), cmdPrintParses(), cmdRenewnet(), cmdWriteAnno(), cmdWriteNet(), cmdWriteParses(), cnBuild(), and cnDelete().

5.6.5.7 Boolean cnShowDeletedFlag

If this flag is set, deleted LVs will be bracketed with [ ] in all output. If it is not set, they will not be shown at all. Definition at line 62 of file constraintnet.c.

Referenced by cmdStatus(), cnInitialize(), and cnPrint().

5.6.5.8 Boolean cnShowDeletedFlag = FALSE

If this flag is set, deleted LVs will be bracketed with [ ] in all output. If it is not set, they will not be shown at all. Definition at line 62 of file constraintnet.c.

Referenced by cmdStatus(), cnInitialize(), and cnPrint().

5.6.5.9 int cnSortNodesMethod

This variable implements the CDG variable sortnodes. Definition at line 76 of file constraintnet.c.

Referenced by cmdStatus(), cnBuildFinal(), cnInitialize(), and cnSortNodes().

5.6.5.10 int cnSortNodesMethod = 0

This variable implements the CDG variable sortnodes. Definition at line 76 of file constraintnet.c.

Referenced by cmdStatus(), cnBuildFinal(), cnInitialize(), and cnSortNodes().

5.6.5.11 Number cnUnaryPruningFraction

This variable gives the approximate ratio of LVs retained while building a constraint net. It defaults to$\sim$1, so that no LVs are deleted upon building. If it is smaller, then from any set W of LVs the worst floor($|W|$ x)) LVs will be removed. Definition at line 73 of file constraintnet.c.

Referenced by cmdStatus(), cnInitialize(), and cnUnaryPruning().

5.6.5.12 Number cnUnaryPruningFraction = 1.0

This variable gives the approximate ratio of LVs retained while building a constraint net. It defaults to$\sim$1, so that no LVs are deleted upon building. If it is smaller, then from any set W of LVs the worst floor($|W|$ x)) LVs will be removed. Definition at line 73 of file constraintnet.c.

Referenced by cmdStatus(), cnInitialize(), and cnUnaryPruning().

5.6.5.13 Boolean cnUseNonSpec

if this Flag is set, newly created constraint networks will contain non-specific dependency edges aswell Definition at line 66 of file constraintnet.c.

Referenced by cnBuildFinal(), cnBuildIter(), cnInitialize(), and cnRenew().

5.6.5.14 Boolean cnUseNonSpec = FALSE

if this Flag is set, newly created constraint networks will contain non-specific dependency edges aswell Definition at line 66 of file constraintnet.c.

Referenced by cnBuildFinal(), cnBuildIter(), cnInitialize(), and cnRenew().

5.7 Eval - routines to evaluate constraint formulas

5.7.1 Detailed Description

Author:
Ingo Schroeder

Date:
7/3/97

This module provides functions to evaluate constraints (structures of type Constraint) on LVs (structures of type LevelValue). The result of evaluating a constraint is always a Boolean, but since constraint formulas are defined compositionally, there are also functions for evaluating terms of other types.

All evaluation functions use output parameters of type Value to compute and return their results. ErrorValue is returned if any error occurred during evaluation, such as an access to a feature of the root node. This typically does not cause a run-time error, but simply makes the containing formula evaluate to FALSE. Note that unpredictable results can be produced if an error occurs in a nested term. Therefore an evaluation error always produces a CDG_WARNING message.

Data Structures

- struct BadnessStruct

Static Strings

These strings are used so often that we want to pre-compute their addresses. This is the only location where it's really important to have full speed. They are initialized in evalInitialize()

- String static_string_chunk_end
- String static_string_chunk_start
- String static_string_chunk_type
- String static_string_from
- String static_string_id
- String static_string_info
- String static_string_to
- String static_string_word

Typedefs

- typedef BadnessStruct * Badness

Enumerations

- enum EvalMethodType { **EMTInterpreted**, **EMTCompiled** }

Functions

- Badness bAdd (Badness b, Number score)
- Badness bAddBadness (Badness a, Badness b)
- Badness bClone (Badness b)
- Boolean bCompare (Badness a, Badness b)
- void bCopy (Badness dest, Badness src)
- void bDelete (Badness b)
- Boolean bEqual (Badness a, Badness b)
- Badness bestBadness (void)
- Badness bNew (int no, int hard, Number soft)
- void bPrint (unsigned long mode, Badness b)
- Badness bSubtract (Badness b, Number score)
- Badness bSubtractBadness (Badness a, Badness b)
- Number evalBinary (LevelValue lva, LevelValue lvb, ConstraintNet net, Vector context, Boolean use_cs_only, Badness b, List *conflicts)
- Boolean evalBinaryConstraint (Constraint c, ConstraintNet net, Vector context, LevelValue lva, LevelValue lvb)
- Boolean evalConstraint (Constraint c, ConstraintNet net, Vector context,...)
- void evalFinalize (void)
- Boolean evalFormula (Formula f, LexemGraph lg, Vector context)
- Number evalInContext (Vector LVs, Vector context, Badness b, List *conflicts)
- void evalInitialize (void)
- Value evalTerm (Term t, Value val, LexemGraph lg, Vector context)
- Number evalUnary (LevelValue lv, ConstraintNet net, Vector context, Boolean use_cs_only, Badness b, List *conflicts)
- Boolean evalUnaryConstraint (Constraint c, ConstraintNet net, Vector context, LevelValue lv)
- Boolean evalValidateEvalMethod (String name, String value, int *var)
- void lock_tree (int width)
- Value peekValue (Value val, List path)
- Boolean significantlyGreater (Number a, Number b)
- void unlock_tree (void)
- Badness worstBadness (void)

Variables

- Constraint evalCurrentConstraint
- Constraint evalCurrentConstraint = NULL
- Formula evalCurrentFormula
- Formula evalCurrentFormula = NULL
- EvalMethodType evalEvaluationMethod
- EvalMethodType evalEvaluationMethod = EMTInterpreted
- EvalMethodType evalPeekValueMethod
- EvalMethodType evalPeekValueMethod = EMTCompiled
- Boolean evalSloppySubsumesWarnings
- Boolean evalSloppySubsumesWarnings = FALSE
- int * has_cache
- int * has_cache = NULL
- int lock_counter
- int lock_counter = 0

- int lock_width
- int lock_width = 0
- String static_string_chunk_end
- String static_string_chunk_start
- String static_string_chunk_type
- String static_string_from
- String static_string_id
- String static_string_info
- String static_string_to
- String static_string_word

5.7.2 Typedef Documentation

5.7.2.1 typedef BadnessStruct* Badness

A pointer to a BadnessStruct Definition at line 60 of file eval.h.

Referenced by bAdd(), bAddBadness(), bClone(), bCompare(), bCopy(), bDelete(), bEqual(), bestBadness(), bNew(), bPrint(), bSubtract(), bSubtractBadness(), evalBinary(), evalInContext(), evalUnary(), and worstBadness().

5.7.3 Enumeration Type Documentation

5.7.3.1 enum EvalMethodType

Evaluation method

This is the Type of the evaluation method which could be:

- interpreted
- compiled

Definition at line 38 of file eval.h.

Referenced by comApprove().

5.7.4 Function Documentation

5.7.4.1 Badness bAdd (Badness *b*, Number *score*)

Add score to a Badness.

This function adds a classical score to a generalized score, i.e. it either increments b->hard or multiplies b->soft by score. Definition at line 258 of file eval.c.

References Badness, BadnessStruct::hard, BadnessStruct::no, and BadnessStruct::soft.

Referenced by evalBinary(), and evalUnary().

5.7.4.2 Badness bAddBadness (Badness *a*, Badness *b*)

Add Badness b to a. Definition at line 290 of file eval.c.

References Badness, BadnessStruct::hard, BadnessStruct::no, and BadnessStruct::soft.

5.7.4.3 Badness bClone (Badness *b*)

Create deep copy of a Badness.

The result is a new Badness owned by the caller. Definition at line 246 of file eval.c.

References Badness, bNew(), BadnessStruct::hard, BadnessStruct::no, and BadnessStruct::soft.

5.7.4.4 Boolean bCompare (Badness *a*, Badness *b*)

Compare two Badnesses.

Returns TRUE if a is properly better than b, FALSE if they are equal. Definition at line 348 of file eval.c.

References Badness, FALSE, BadnessStruct::hard, significantlyGreater(), BadnessStruct::soft, and TRUE.

Referenced by cmdWriteAnno().

5.7.4.5 void bCopy (Badness *dest*, Badness *src*)

Copy a Badness.

src must have been allocated by the caller. Definition at line 236 of file eval.c.

References Badness.

5.7.4.6 void bDelete (Badness *b*)

De-allocate a Badness. Definition at line 317 of file eval.c.

References Badness.

5.7.4.7 Boolean bEqual (Badness *a*, Badness *b*)

Test if two badnesses are equal. Definition at line 338 of file eval.c.

References Badness, BadnessStruct::hard, and BadnessStruct::soft.

5.7.4.8 Badness bestBadness (void)

Return new Badness better than any other.

The result is owned by the caller. Definition at line 370 of file eval.c.

References Badness, and bNew().

5.7.4.9 Badness bNew (int *no*, int *hard*, Number *soft*)

Allocate a Badness. Definition at line 219 of file eval.c.

References Badness, BadnessStruct::hard, BadnessStruct::no, and BadnessStruct::soft.

Referenced by bClone(), bestBadness(), and worstBadness().

5.7.4.10 void bPrint (unsigned long *mode*, Badness *b*)

Print a badness in canonical form. Definition at line 325 of file eval.c.

References Badness, cdgPrintf(), BadnessStruct::hard, BadnessStruct::no, and BadnessStruct::soft.

5.7.4.11 Badness bSubtract (Badness *b*, Number *score*)

Subtract score from a Badness. Definition at line 274 of file eval.c.

References Badness, BadnessStruct::hard, BadnessStruct::no, and BadnessStruct::soft.

5.7.4.12 Badness bSubtractBadness (Badness *a*, Badness *b*)

Subtract Badness b from a. Definition at line 302 of file eval.c.

References Badness, BadnessStruct::hard, BadnessStruct::no, and BadnessStruct::soft.

5.7.4.13 Number evalBinary (LevelValue *lva*, LevelValue *lvb*, ConstraintNet *net*, Vector *context*, Boolean *use_cs_only*, Badness *b*, List * *conflicts*)

Evaluate all constraints on two LVs.

This function performs a conceptually simple task: it computes the combined score of two LVs in a constraint net and returns the computed score. This is done by applying evalConstraint() to all known constraints and tallying the scores of all violated constraints.

For efficiency reasons, the actual implementation of this function is much more complicated:

- The entire function can be run in fast mode or in thorough mode. In fast mode, the function will stop applying constraints if a constraint with score 0 is violated, and return 0 immediately. In thorough mode, it will keep applying all possible constraints and bAdd() the results to the Badness b. Also, ConstraintViolation structures will be allocated and inserted into the List conflicts. Thorough mode is requested by passing a non-null value for b. For fast mode, both b and conflicts should be NULL.
- In fast mode, if the LVs lva and lvb have already been evaluated by this function and scUseCache was set during both invocations of evalBinary(), the result is read from net->cache and not computed again.
- To make this case more probable, the LVs lva and lvb are always sorted by the number of their respective levels. (That is, only half of the entire cache is ever used.)
- Even if no precomputed result exists, not all constraints may be evaluated:

Unary constraints are ignored completely.

Inactive constraints and constraints from inactive sections are skipped likewise.

Of the remaining constraints, only those that may actually fail are evaluated. Hence not all constraints are evaluated, but only those whose signature matches the actual configuration existing between lva and lvb. The List of these constraints is found in the matrix cdgConstraintMatrix[].

In fast mode, if a hard constraint is violated, the result 0.0 is returned immediately.

If the parameter context is NULL, context-sensitive constraints will not be evaluated.

If the parameter use_cs_only is set, ONLY context-sensitive constraints will be evaluated. See evalInContext() for why this is occasionally necessary.

- Theoretically, a binary constraint may be violated twice by two LVs. Think of a constraint that forbids the label X to appear more than once in an analysis. If two LVs with label X are evaluated jointly, both (a,b) and (b,a) violate this condition. But since the two violations do not really indicate different errors, this kind of double fault is usually not desired.

A double fault can only occur if the LVs match the signature of a constraint in both variants of instantiation. Since every binary constraint signature must explicitly state the two levels it refers to, this is only possible if both LVs belong to the same level and either their configuration is symmetrical, or it is is asymmetrical, but the signature of the constraint subsumes both configurations.

To eliminate all double faults, evalBinary() checks for all of these possibilities explicitly.

- If a value was computed rather than looked up, and scUseCache is set, it is registered in net->cache.

The parameter net can be NULL, so that LVs can be evaluated even in the absence of a constraint net. In this case no caching is possible. Definition at line 1395 of file eval.c.

References bAdd(), Badness, ConstraintNetStruct::cache, CDG_DEBUG, cdgPrintf(), ConstraintNet, cvNew(), evalBinaryConstraint(), FALSE, lock_tree(), NULL, scGetScore(), scSetScore(), scUseCache, TRUE, and unlock_tree().

Referenced by cnBuildEdges(), comCompareAllLvPairs(), comCompareWithContext(), and evalInContext().

5.7.4.14 Boolean evalBinaryConstraint (Constraint *c*, ConstraintNet *net*, Vector *context*, LevelValue *lva*, LevelValue *lvb*)

Evaluate one binary constraint on two LVs.

This function evaluates a binary constraint. It has the same effect as evalConstraint() used with five arguments, but saves the overhead of accessing the variable argument list. Also, it will call a compiled constraint function rather than evalConstraint() if possible. Definition at line 1188 of file eval.c.

References CDG_HOOK, CDG_WARNING, cdgExecHook(), cdgPrintf(), ConstraintNet, ConstraintNetStruct::evalBinary, evalCurrentConstraint, evalEvaluationMethod, evalFormula(), evalTerm(), hkVerbosity, HOOK_EVAL, NULL, and TRUE.

Referenced by cvAnalyse(), and evalBinary().

5.7.4.15 Boolean evalConstraint (Constraint *c*, ConstraintNet *net*, Vector *context*, ...)

Evaluate a constraint w.r.t. the specified LVs.

Here's the detailed algorithm:

- check the number of arguments and returns TRUE (with a warning) if it does not match the arity of c
- instantiate the variables in c->vars with the LVs passed as arguments
- do *not* check whether c is applicable to these LVs. Applying constraints to arbitrary LVs can produce spurious constraint violations without warning! Hence evalConstraint() should only be called on constraints whose applicability was previously checked by match{Unary,Binary}Signature().
- set evalCurrentConstraint and evaluates c->formula using evalFormula()
- reset evalCurrentConstraint

- if the result was FALSE and c has a variable penalty (if c->penaltyTerm is non-NULL), set c->penalty to evalTerm(c->penaltyTerm)
- execute the hook HOOK_EVAL
- de-instantiate c->vars
- increase either evalUnary or evalBinary
- return the result of evalFormula()

The net is actually only used to record statistics (the fields evalUnary and evalBinary) and can be NULL.

The context may be NULL. If it is not NULL it should be a Vector of LVs, each of which must be located at its index as calculated by lvIndex(). This is then passed on to predicates and functions that need to examine the context of an LV to operate.

If the constraint c uses such a function or predicate (that is, if it has its is_context_sensitive flag set) and there is no context, then evalConstraint() returns TRUE. This is obviously not always correct, so if you do not provide context to your evaluations and still use context-sensitive constraints, you can miss some conflicts.

This function can evaluate constraints of arbitrary arity. The number of LVs passed must equal the arity. Unary and binary constraints can also be evaluated by evalUnaryConstraint() and evalBinaryConstraint(). Those functions are slightly faster than using the general vararg mechanism. Definition at line 1040 of file eval.c.

References CDG_HOOK, CDG_WARNING, cdgExecHook(), cdgPrintf(), ConstraintNet, ConstraintNetStruct::evalBinary, evalCurrentConstraint, evalFormula(), evalTerm(), ConstraintNetStruct::evalUnary, FALSE, hkVerbosity, HOOK_EVAL, NULL, and TRUE.

5.7.4.16 void evalFinalize (void)

finalize the eval module Definition at line 1666 of file eval.c.

References cdgFreeString(), static_string_chunk_end, static_string_chunk_start, static_string_chunk_type, static_string_from, static_string_id, static_string_info, static_string_to, and static_string_word.

Referenced by cdgFinalize().

5.7.4.17 Boolean evalFormula (Formula *f*, LexemGraph *lg*, Vector *context*)

Evaluate a formula.

This function interprets the Boolean formulas defined in the cdg input language. It is basically a comprehensive listing of actions for each possible value of f->type.

Each of the different types of formula is evaluated in the expected way. In particular, conjunctions, implications and disjunction are guaranteed to short-circuit in the same way as the corresponding C operators.

Binary relations (FTEqual etc.) are evaluated by calling evalTerm() on both halves of the formula. If the two resulting types are not compatible, FALSE is returned with a warning. In general, every type is only compatible with itself. The ErrorValue is not compatible with any type, not even with itself.

The various relations are defined as follows:

- Two strings are equal if they are identical (since no strings are duplicated in cdg, this is equivalent to checking whether they have the same reading).

- Two numbers are equal if == holds between them.
- Two lexeme nodes are equal if they were created from the same grapheme node or they are both NULL. Note that this may judge two simultaneous lexeme nodes as equal even though they are acoustically incompatible. This case should not arise since no constraint should ever be evaluated on two incompatible LVs; however, evalFormula() does not check this.
- Two underspecified values or an underspecified and a specified value are never equal.
- FTGreater holds between two numbers that satisfy C's > operator.
- FTLess holds between two numbers that satisfy C's < operator.

If f->type is FTConnexion, subsumesConnexion() is called to check whether the specification f->data.connexion.c subsumes the actual configuration of the LVs found in the fields f->data.connexion.var1->levelvalue and f->data.connexion.var2->levelvalue.

If f=>type is FTDirection, subsumesDirection() is called to check whether the specification f->data.direction.d subsumes the Direction of the LevelValue structure found in the field f->data.direction.var->levelvalue. Definition at line 434 of file eval.c.

References CDG_WARNING, cdgPrintf(), evalCurrentFormula, evalTerm(), FALSE, LexemNode, NULL, and TRUE.

Referenced by evalBinaryConstraint(), evalConstraint(), and evalUnaryConstraint().

5.7.4.18 Number evalInContext (Vector *LVs*, Vector *context*, Badness *b*, List * *conflicts*)

Eval context-sensitive constraints only.

This function evaluates all LVs in the Vector LVs against each other, using only context-sensitive constraints, and assuming that the context is context.

This is useful for methods that cannot normally provide context, e.g. because they operate incrementally. Such methods should use normal evalUnary and evalBinary calls with no context while they are building a structure, and then this function once the structure is complete.

Note that LVs and context can be different; one frobbing method actually needs to eval a subset of a structure, but in the global context. Definition at line 1614 of file eval.c.

References Badness, evalBinary(), evalUnary(), NULL, and TRUE.

5.7.4.19 void evalInitialize (void)

Initialize the eval module Definition at line 1642 of file eval.c.

References evalEvaluationMethod, evalPeekValueMethod, evalSloppySubsumesWarnings, evalValidateEvalMethod(), FALSE, NULL, static_string_chunk_end, static_string_chunk_start, static_string_chunk_type, static_string_from, static_string_id, static_string_info, static_string_to, static_string_word, and TRUE.

Referenced by cdgInitialize().

5.7.4.20 Value evalTerm (Term *t*, Value *val*, LexemGraph *lg*, Vector *context*)

evaluate a CDG Term.

Parameters:

t the term to be evaluated

val temporary storage where the result is stored in

lg the current lexemgraph

context the current parse tree (or NULL)

Returns:

a pointer to `val` or the ErrorValue

This function evaluates a term on a value of the cdg formula language, computing both its type and its value. Both are returned as the result of evalTerm(). The function performs an exhaustive case distinction over the possible values of `t->type:`

- TTTopPeek: The field `t->data.peek.varinfo->levelvalue->modifiee` is checked. If the modifiee is underspecified, ErrorValue is returned, otherwise peekValue() is applied to the path `t->data.peek.path` in the value of the modifiee.

  Exceptions occur if `t->data.peek.path` is `id`, `word`, `from` or `to`. These special attributes are notated like features of a lexeme node, but are actually attributes of the lexeme node, and not the lexeme itself. These attributes are computed as follows:

  - the attribute id is computed by setting `val->lexemnode` to the modifiee itself. If the modifiee is underspecified, ErrorValue is returned, VTLexemNode otherwise.
  - the attribute word is computed by setting `val->data.string` to the field word of the lexical entry of the modifier. (Strictly speaking, this ∗is∗ an attribute of the lexeme rather than the lexeme node; but as it does not appear in the feature matrix, it cannot be computed by peekValue().) If the modifiee is underspecified, ErrorValue is returned, `val` otherwise.
  - the attribute from is computed by setting `val->data.number` to the field from of the modifiee. If the modifiee is underspecified, `lg->max+1` is assigned instead. In any case, `val` is returned.
  - the attribute to is computed by setting `val->data.number` to the field to of the modifiee. If the modifiee is underspecified, the number `lg->max+2` is assigned instead. In any case, `val` is returned.

- TTBottomPeek: The same algorithm is applied to the modifier of the LevelValue – simplified by the fact that modifiers cannot be underspecified.
- TTLabel: `val->data.string` is set to the field label of the LV and `val` is returned.
- TTLevel: `val->data.string` is set to the identifier of the Level of LV, and `val` is returned.
- TTAdd, TTSubtract, TTMultiply, TTDivide: The two fields `t->data.operation.op1` and `t->data.operation.op1` are evaluated by evalTerm(). ErrorValue is returned unless both results are numbers. Dividing by `0` also returns ErrorValue. Otherwise the results are conjoined by the corresponding C operator (+, -, ∗ oder /), `val->data.number` is set to the result of this computation, and VTNumber is returned. applied to t->data.function.args (and lg) and both the resulting type and the computed are passed to the caller of evalTerm().
- TTString: `val->data.string` is set to `t->data.string`, and `val` is returned.
- TTNumber: `val->data.number` is set to `t->data.number`, and `val` is returned.

Definition at line 710 of file eval.c.

References GraphemNodeStruct::arc, LexemNodeStruct::arc, CDG_WARNING, cdgPrintf(), GraphemNodeStruct::chunk, Chunk, chunkerStringOfChunkType(), evalPeekValueMethod, FALSE, ChunkStruct::from, LexemNodeStruct::grapheme, LexemNodeStruct::lexem, LexemNode, LexemGraphStruct::max, peekValue(), static_string_chunk_end, static_string_chunk_start, static_string_chunk_type, static_string_from, static_string_id, static_string_info, static_string_to, static_string_word, and ChunkStruct::to.

Referenced by evalBinaryConstraint(), evalConstraint(), evalFormula(), and evalUnaryConstraint().

5.7.4.21 Number evalUnary (LevelValue *lv*, ConstraintNet *net*, Vector *context*, Boolean *use_cs_only*, Badness *b*, List * *conflicts*)

Eval unary constraints on LV.

This function applies all unary constraints to lv. It uses the Vector cdgConstraintVector in much the same way as evalBinary() uses cdgConstraintMatrix. The same exceptions for deactivated constraints apply as in that function. In addition, evalUnary() stores all violated local constraints in the List lv->constraints. Definition at line 1259 of file eval.c.

References bAdd(), Badness, CDG_DEBUG, cdgPrintf(), ConstraintNet, cvNew(), evalUnaryConstraint(), and NULL.

Referenced by cnBuildLv(), and evalInContext().

5.7.4.22 Boolean evalUnaryConstraint (Constraint *c*, ConstraintNet *net*, Vector *context*, LevelValue *lv*)

Evaluate a unary constraint on LV.

This function evaluates a unary constraint. It has the same effect as evalConstraint() used with four arguments, but saves the overhead of accessing the variable argument list. Also, it will call a compiled constraint function rather than evalConstraint() if possible. Definition at line 1122 of file eval.c.

References CDG_HOOK, CDG_WARNING, cdgExecHook(), cdgPrintf(), ConstraintNet, evalCurrentConstraint, evalEvaluationMethod, evalFormula(), evalTerm(), ConstraintNetStruct::evalUnary, hkVerbosity, HOOK_EVAL, NULL, and TRUE.

Referenced by evalUnary().

5.7.4.23 Boolean evalValidateEvalMethod (String *name*, String *value*, int * *var*)

This is the validation function for the CDG variable evalmethod. Definition at line 1681 of file eval.c.

References CDG_WARNING, cdgPrintf(), FALSE, and TRUE.

Referenced by evalInitialize().

5.7.4.24 void lock_tree (int *width*)

Declare evaluation lock.

When many constraints are evaluated on the same dependency tree, it can be worthwhile to cache the result of common subformulas. Therefore we offer the caller the possibility to declare that the dependency tree will not change during the next evaluations. The module eval is then free to reuse the results of previous evaluations until the tree is unlocked again.

WIDTH specifies the number of time points in the lexeme graph that will be used in the evaluations. Definition at line 157 of file eval.c.

References has_cache, lock_counter, and lock_width.

Referenced by evalBinary().

5.7.4.25 Value peekValue (Value *val*, List *path*)

returns value for a path in a feature matrix Definition at line 611 of file eval.c.

References CDG_WARNING, cdgPrintf(), and NULL.

Referenced by evalTerm().

5.7.4.26 Boolean significantlyGreater (Number *a*, Number *b*)

Compare Numbers with some margin for rounding error.

Upon removing conflicts and introducing new ones, the score of a structure must frequently be multiplied and divided with constants. Repeated use of this practice may introduce rounding errors. Therefore we use a special function for comparison with some margin for error. The problem of distinguishing rounding errors from very subtle penalties remains unsolved. Definition at line 206 of file eval.c.

Referenced by bCompare().

5.7.4.27 void unlock_tree (void)

Release evaluation lock.

If lock_tree() was called multiple times, evaluation remains locked onto the current tree until each call been cancelled individually. Definition at line 178 of file eval.c.

References CDG_ERROR, cdgPrintf(), has_cache, lock_counter, lock_width, and NULL.

Referenced by evalBinary().

5.7.4.28 Badness worstBadness (void)

Return new Badness worse than any other.

Strictly speaking, this is not the worst Badness that any structure could ever have, but I guess it will do.

The result is owned by the caller. Definition at line 383 of file eval.c.

References Badness, and bNew().

5.7.5 Variable Documentation

5.7.5.1 Constraint evalCurrentConstraint

This variable is set to the current Constraint during an evaluation, NULL otherwise. Definition at line 80 of file eval.c.

Referenced by evalBinaryConstraint(), evalConstraint(), and evalUnaryConstraint().

5.7.5.2 Constraint evalCurrentConstraint = NULL

This variable is set to the current Constraint during an evaluation, NULL otherwise. Definition at line 80 of file eval.c.

Referenced by evalBinaryConstraint(), evalConstraint(), and evalUnaryConstraint().

5.7.5.3 Formula evalCurrentFormula

Set to the current Formula during an evaluation, NULL otherwise.

Actually this is not strictly true. During evaluation, it is set to the formula whose evaluation was most recently ∗begun∗, which is not at all the same; if we evaluate the formula

```
X@cat = N & X^cat != V
```

then the first formula (&) will be evaluated first, then the second formula (=) and then the third one (!=), but after that, evalCurrentFormula is not reset to the first formula. To trace the progress of evaluation exactly, we would need either LISP-style dynamic binding, or an extra Formula argument across the entire chain of evaluation. But since evalCurrentFormula is only used within predHas() to distinguish different has() invocations from each other, and those do not nest, the current behaviour is sufficient. Definition at line 100 of file eval.c.

Referenced by evalFormula().

5.7.5.4 Formula evalCurrentFormula = NULL

Set to the current Formula during an evaluation, NULL otherwise.

Actually this is not strictly true. During evaluation, it is set to the formula whose evaluation was most recently ∗begun∗, which is not at all the same; if we evaluate the formula

```
X@cat = N & X^cat != V
```

then the first formula (&) will be evaluated first, then the second formula (=) and then the third one (!=), but after that, evalCurrentFormula is not reset to the first formula. To trace the progress of evaluation exactly, we would need either LISP-style dynamic binding, or an extra Formula argument across the entire chain of evaluation. But since evalCurrentFormula is only used within predHas() to distinguish different has() invocations from each other, and those do not nest, the current behaviour is sufficient. Definition at line 100 of file eval.c.

Referenced by evalFormula().

5.7.5.5 EvalMethodType evalEvaluationMethod

Implements evalmethod. Definition at line 116 of file eval.c.

Referenced by cmdCompile(), cmdLoad(), cmdStatus(), comApprove(), comCompareAllLvPairs(), comCompareWithContext(), evalBinaryConstraint(), evalInitialize(), and evalUnaryConstraint().

5.7.5.6 EvalMethodType evalEvaluationMethod = EMTInterpreted

Implements evalmethod. Definition at line 116 of file eval.c.

Referenced by cmdCompile(), cmdLoad(), cmdStatus(), comApprove(), comCompareAllLvPairs(), comCompareWithContext(), evalBinaryConstraint(), evalInitialize(), and evalUnaryConstraint().

5.7.5.7 EvalMethodType evalPeekValueMethod

Implements peekvaluemethod. Definition at line 119 of file eval.c.

Referenced by cmdStatus(), evalInitialize(), and evalTerm().

5.7.5.8 EvalMethodType evalPeekValueMethod = EMTCompiled

Implements peekvaluemethod. Definition at line 119 of file eval.c.

Referenced by cmdStatus(), evalInitialize(), and evalTerm().

5.7.5.9 Boolean evalSloppySubsumesWarnings

Implements subsumesWarnings.

If a constraint evaluation tries to access lexical information of the root node, the corresponding subexpression unconditionally evaluates to FALSE, and a warning is printed. This flag can be used to turn off the warnings; however the interpretation of the erroneous expression as FALSE remains. It is therefore recommended that you write all constraints so that they will not access features of the root node in the first place. Definition at line 113 of file eval.c.

Referenced by cmdStatus(), and evalInitialize().

5.7.5.10 Boolean evalSloppySubsumesWarnings = FALSE

Implements subsumesWarnings.

If a constraint evaluation tries to access lexical information of the root node, the corresponding subexpression unconditionally evaluates to FALSE, and a warning is printed. This flag can be used to turn off the warnings; however the interpretation of the erroneous expression as FALSE remains. It is therefore recommended that you write all constraints so that they will not access features of the root node in the first place. Definition at line 113 of file eval.c.

Referenced by cmdStatus(), and evalInitialize().

5.7.5.11 int* has_cache

At the moment, only the results of identical has() applications are cached because those are expected to be particularly expensive. In principle, this method could be extended to arbitrary identical subformulas.

The result of the application of has() number X at time point T is stored in cell X * lock_width + T. 2 means TRUE, 1 means FALSE, and 0 'unknown'. Definition at line 142 of file eval.c.

Referenced by lock_tree(), and unlock_tree().

5.7.5.12 int* has_cache = NULL

At the moment, only the results of identical has() applications are cached because those are expected to be particularly expensive. In principle, this method could be extended to arbitrary identical subformulas.

The result of the application of has() number X at time point T is stored in cell X ∗ lock_width + T. 2 means TRUE, 1 means FALSE, and 0 'unknown'. Definition at line 142 of file eval.c.

Referenced by lock_tree(), and unlock_tree().

5.7.5.13 int lock_counter

Notes whether evaluation is locked.

Since locks can be nested, this counter can rise above 1; any value higher than 0 means that cached results are still valid. Definition at line 126 of file eval.c.

Referenced by lock_tree(), and unlock_tree().

5.7.5.14 int lock_counter = 0

Notes whether evaluation is locked.

Since locks can be nested, this counter can rise above 1; any value higher than 0 means that cached results are still valid. Definition at line 126 of file eval.c.

Referenced by lock_tree(), and unlock_tree().

5.7.5.15 int lock_width

The number of time points in the lexeme graph that will be used in the evaluations Definition at line 131 of file eval.c.

Referenced by lock_tree(), and unlock_tree().

5.7.5.16 int lock_width = 0

The number of time points in the lexeme graph that will be used in the evaluations Definition at line 131 of file eval.c.

Referenced by lock_tree(), and unlock_tree().

5.7.5.17 String static_string_chunk_end

static string *"chunk_end"* Definition at line 74 of file eval.c.

Referenced by evalFinalize(), evalInitialize(), and evalTerm().

5.7.5.18 String static_string_chunk_end

static string *"chunk_end"* Definition at line 74 of file eval.c.

Referenced by evalFinalize(), evalInitialize(), and evalTerm().

5.7.5.19 String static_string_chunk_start

static string *"chunk_start"* Definition at line 73 of file eval.c.

Referenced by evalFinalize(), evalInitialize(), and evalTerm().

5.7.5.20 String static_string_chunk_start

static string *"chunk_start"* Definition at line 73 of file eval.c.

Referenced by evalFinalize(), evalInitialize(), and evalTerm().

5.7.5.21 String static_string_chunk_type

static string *"chunk_type"* Definition at line 75 of file eval.c.

Referenced by evalFinalize(), evalInitialize(), and evalTerm().

5.7.5.22 String static_string_chunk_type

static string *"chunk_type"* Definition at line 75 of file eval.c.

Referenced by evalFinalize(), evalInitialize(), and evalTerm().

5.7.5.23 String static_string_from

static string *"from"* Definition at line 70 of file eval.c.

Referenced by evalFinalize(), evalInitialize(), and evalTerm().

5.7.5.24 String static_string_from

static string *"from"* Definition at line 70 of file eval.c.

Referenced by evalFinalize(), evalInitialize(), and evalTerm().

5.7.5.25 String static_string_id

static string *"id"* Definition at line 68 of file eval.c.

Referenced by evalFinalize(), evalInitialize(), and evalTerm().

5.7.5.26 String static_string_id

static string *"id"* Definition at line 68 of file eval.c.

Referenced by evalFinalize(), evalInitialize(), and evalTerm().

5.7.5.27 String static_string_info

static string *"info"* Definition at line 72 of file eval.c.

Referenced by evalFinalize(), evalInitialize(), and evalTerm().

5.7.5.28 String static_string_info

static string *"info"* Definition at line 72 of file eval.c.

Referenced by evalFinalize(), evalInitialize(), and evalTerm().

5.7.5.29 String static_string_to

static string *"to"* Definition at line 71 of file eval.c.

Referenced by evalFinalize(), evalInitialize(), and evalTerm().

5.7.5.30 String static_string_to

static string *"to"* Definition at line 71 of file eval.c.

Referenced by evalFinalize(), evalInitialize(), and evalTerm().

5.7.5.31 String static_string_word

static string *"word"* Definition at line 69 of file eval.c.

Referenced by evalFinalize(), evalInitialize(), and evalTerm().

5.7.5.32 String static_string_word

static string *"word"* Definition at line 69 of file eval.c.

Referenced by evalFinalize(), evalInitialize(), and evalTerm().

5.8 HookCore - C Part in the core system

5.8.1 Detailed Description

The Hook module connects the core of the library to its outside world by a callback mechanism. Hook functions are to be supplied by the application programmer and will be called at strategic points in the application. For instance, a commonly used hook is HOOK_PRINTF, that handles the output channels (see below).

So hooking the HOOK_PRINTF callback allows you to redefine and redirect the channels. The following callbacks are defined:

- HOOK_CNBUILDNODES
- HOOK_EVAL
- HOOK_NSSEARCH
- HOOK_PRINTF
- HOOK_FLUSH
- HOOK_GLSINTERACTION
- HOOK_GETS
- HOOK_PROGRESS
- HOOK_PARTIALRESULT
- HOOK_ICINTERACTION
- HOOK_RESET

As a part of that the output channels are handled here. The following output channels exist:

- CDG_HINT
- CDG_INFO
- CDG_WARNING
- CDG_PROLOG
- CDG_EVAL
- CDG_SEARCHRESULT
- CDG_PROFILE
- CDG_HOOK
- CDG_ERROR
- CDG_DEBUG
- CDG_DEFAULT
- CDG_PROGRESS
- CDG_XML

Note, that the term *hook* and *callback* are used mostly as synonyms. (Actually the term hook should be replaced by callback for clarity.)

As oposed to other modules some of the functions in this module are not prefixed by `hk` as the Coding style dictates. The reason for that lies in the relative importance of this module and some of its functions to the overall system, i.e. cdgPrintf().

Data Structures

- struct HookStruct

Defines

- #define CDG_DEBUG (1L << 9)
- #define CDG_DEFAULT (1L << 10)
- #define CDG_ERROR (1L << 8)
- #define CDG_EVAL (1L << 4)
- #define CDG_HINT (1L << 0)
- #define CDG_HOOK (1L << 7)
- #define CDG_INFO (1L << 1)
- #define CDG_PROFILE (1L << 6)
- #define CDG_PROGRESS (1L << 11)
- #define CDG_PROLOG (1L << 3)
- #define CDG_SEARCHRESULT (1L << 5)
- #define CDG_WARNING (1L << 2)
- #define CDG_XML (1L << 12)
- #define HOOK_CNBUILDNODES 0
- #define HOOK_EVAL 1
- #define HOOK_FLUSH 4
- #define HOOK_GETS 7
- #define HOOK_GLSINTERACTION 6
- #define HOOK_ICINTERACTION 10
- #define HOOK_NSSEARCH 2
- #define HOOK_PARTIALRESULT 9
- #define HOOK_PRINTF 3
- #define HOOK_PROGRESS 8
- #define HOOK_RESET 5

Typedefs

- typedef HookStruct * Hook
- typedef void HookFunction ()

Functions

- void cdgExecHook (int hookNo,...)
- void cdgFlush (void)
- void cdgGetString (String buffer, int size)
- void cdgPrintf (int mode, String format,...)

- void hkCallback (String name, Boolean *var)
- void hkFinalize (void)
- int hkFindNoOfHook (String name)
- void hkInitialize (void)
- Boolean hkValidate (String name, String value, Boolean *var)

Variables

- Vector hkHooks
- Vector hkHooks = NULL
- unsigned long int hkVerbosity
- unsigned long int hkVerbosity = CDG_DEFAULT | CDG_ERROR | CDG_INFO | CDG_WARNING | CDG_SEARCHRESULT

5.8.2 Define Documentation

5.8.2.1 #define CDG_DEBUG (1L << 9)

identification of the DEBUG channel. This message increases the normal output verbosity by offering debug information. Definition at line 167 of file hook.h.

Referenced by cmdStatus(), cnBuildEdges(), cnBuildLv(), cnBuildNodes(), cnBuildUpdateArcs(), cnOptimizeNet(), cnOptimizeNode(), cnPrintActiveLVs(), cnSortNodes(), cnTag(), comMake(), embedChunk(), evalBinary(), evalUnary(), findChunk(), getCategories(), getChunks(), getFakeChunksAt(), hkInitialize(), initRealChunker(), lgPartitions(), mergeChunk(), postProcessChunks(), and scSetScore().

5.8.2.2 #define CDG_DEFAULT (1L << 10)

identification of the DEFAULT channel. Unclassified messages of messages that should only be supressed in very rare cases are emitet on the DEFAULT channel. Definition at line 174 of file hook.h.

Referenced by cmdAnnotation(), cmdConstraint(), cmdDistance(), cmdEdges(), cmdHelp(), cmdHierarchy(), cmdHook(), cmdLevel(), cmdLexicon(), cmdLicense(), cmdNet(), cmdNonSpecCompatible(), cmdSection(), cmdStatus(), cmdVersion(), cmdWordgraph(), comApprove(), comCompile(), commandLoop(), and hkInitialize().

5.8.2.3 #define CDG_ERROR (1L << 8)

identification of the ERROR channel. This channel transmits messages about unexpected events that lead to an abortion of further computation. Compare to WARNING. Definition at line 160 of file hook.h.

Referenced by cdgExecHook(), cdgPrintf(), chunkerChunk(), chunkerCommandValidate(), chunkerNew(), cmdAnno2Parse(), cmdAnnos2prolog(), cmdAnnotation(), cmdChunk(), cmdCompareParses(), cmdCompile(), cmdConstraint(), cmdDistance(), cmdEdges(), cmdHelp(), cmdHierarchy(), cmdHook(), cmdIncrementalCompletion(), cmdInputwordgraph(), cmdISearch(), cmdLevel(), cmdLevelsort(), cmdLoad(), cmdLs(), cmdNet(), cmdNetdelete(), cmdNetsearch(), cmdNewnet(), cmdNonSpecCompatible(), cmdParsedelete(), cmdParses2prolog(), cmdPrintParse(), cmdPrintParses(), cmdRenewnet(), cmdReset(), cmdSection(), cmdSet(), cmdShowlevel(), cmdStatus(), cmdTagger(), cmdTesting(), cmdUseconstraint(), cmdUselevel(), cmdUseLexicon(), cmdVerify(), cmdWeight(), cmdWordgraph(), cmdWriteAnno(), cmdWriteNet(), cmdWriteParses(), cmdWriteWordgraph(), comApprove(), comCompareAllLvPairs(), comCompareAllLvs(), comCompareLvs(), comCompareNets(), comCompareWithContext(), comCompile(),

comFinitGrammar(), comInitGrammar(), comLoad(), comMake(), commandEval(), computeNoOfPaths-FromStart(), computeNoOfPathsToEnd(), dbClose(), dbGetEntries(), dbLoadEntries(), dbOpen(), db-OpenIndexFile(), getChunks(), hkInitialize(), initChunker(), initFakeChunker(), initRealChunker(), lg-AreDeletableNodes(), lgCompatibleNodes(), lgDistanceOfNodes(), parseGetGrapheme(), scSetScore(), smDelete(), smGetFlag(), smGetScore(), smSetAllFlags(), smSetFlag(), smSetScore(), terminateChild(), timerElapsed(), and unlock_tree().

5.8.2.4 #define CDG_EVAL (1L << 4)

identification of the EVAL channel.

Todo

The EVAL channel is bogus and never used.

Definition at line 130 of file hook.h.

Referenced by cmdStatus(), and hkInitialize().

5.8.2.5 #define CDG_HINT (1L << 0)

identification of the HINT channel.

Todo

The HINT channel is bogus and never used.

Definition at line 103 of file hook.h.

Referenced by cmdStatus(), and hkInitialize().

5.8.2.6 #define CDG_HOOK (1L << 7)

global hook flag. This flag switches on/off the complete hook system.

Todo

By no means this is an output channel. This define should be removed and replaced with a proper variable that is altered by the hook command.

Definition at line 153 of file hook.h.

Referenced by cmdHook(), cmdStatus(), cnBuildNodes(), evalBinaryConstraint(), evalConstraint(), and evalUnaryConstraint().

5.8.2.7 #define CDG_INFO (1L << 1)

identification of the INFO channel. Most of the output of the CDG library is tagged as INFO. A message to the INFO channel is *informal*. Definition at line 110 of file hook.h.

Referenced by cdgDeleteComputed(), chunkerChunk(), cmdAnno2Parse(), cmdAnnos2prolog(), cmd-Chunk(), cmdCompile(), cmdHook(), cmdIncrementalCompletion(), cmdInputwordgraph(), cmdISearch(), cmdLevelsort(), cmdLexicon(), cmdLoad(), cmdNetsearch(), cmdNewnet(), cmdNonSpecCompatible(), cmdParsedelete(), cmdParses2prolog(), cmdRenewnet(), cmdSet(), cmdShowlevel(), cmdStatus(), cmd-Useconstraint(), cmdUselevel(), cmdVerify(), cmdWeight(), cnCallback(), cnPrintActiveLVs(), cnPrint-Info(), cnPrintParses(), cnTag(), cnUnaryPruning(), comLoad(), comMake(), comTranslate(), cvAnalyse(), cvPrint(), dbLoad(), dbLoadAll(), dbLoadEntries(), evalChunker(), hkInitialize(), and lgNewFinal().

5.8.2.8 #define CDG_PROFILE (1L << 6)

identification of the PROFILE channel. This channel is used to emit profiling information, that is time statistics on computations. Definition at line 144 of file hook.h.

Referenced by cmdChunk(), cmdIncrementalCompletion(), cmdISearch(), cmdNewnet(), cmdStatus(), cnBuildEdges(), cnBuildNodes(), and hkInitialize().

5.8.2.9 #define CDG_PROGRESS (1L << 11)

identification of the PROGRESS channel. Messages about progress are emited on this channel and might be redirected over the HOOK_PROGRESS callback. Definition at line 181 of file hook.h.

Referenced by cdgPrintf(), cmdAnno2Parse(), cmdStatus(), dbLoadAll(), and hkInitialize().

5.8.2.10 #define CDG_PROLOG (1L << 3)

identification of the PROLOG channel.

Todo

The PROLOG channel is bogus and never used.

Definition at line 124 of file hook.h.

Referenced by cmdStatus(), and hkInitialize().

5.8.2.11 #define CDG_SEARCHRESULT (1L << 5)

identification of the SEARCHRESULT channel. Results in a parser are emited on this channel. All parsing falvours should obey to this channel semantics. Most of them do. Definition at line 137 of file hook.h.

Referenced by cmdNetsearch(), cmdStatus(), and hkInitialize().

5.8.2.12 #define CDG_WARNING (1L << 2)

identification of the WARNING channel. A message to this channel informs about an unexpected situation. Operations continue. If a normal continuation is not possible the message should be emitted on the ERROR channel. Definition at line 118 of file hook.h.

Referenced by cdgAgInsert(), cdgPrintf(), cmdAnno2Parse(), cmdLs(), cmdNewnet(), cmdStatus(), cnBuild(), cnBuildFinal(), cnDelete(), cnFindNode(), cnOptimizeNode(), cnPrintInfo(), comApprove(), commandLoop(), dbAvailable(), evalBinaryConstraint(), evalChunker(), evalConstraint(), evalFormula(), evalTerm(), evalUnaryConstraint(), evalValidateEvalMethod(), getCategory(), getChunks(), getNextArgument(), hkInitialize(), lgDeleteNode(), lgDeleteNodes(), lgMostProbablePath(), lgNewFinal(), lgNewIter(), lgSimultaneous(), peekValue(), and terminateChild().

5.8.2.13 #define CDG_XML (1L << 12)

identification of the PROGRESS channel. All xml output goes in this channel. See the write module for more infofmation on xml output. Definition at line 188 of file hook.h.

Referenced by cmdStatus(), commandEval(), and hkInitialize().

5.8.2.14 #define HOOK_CNBUILDNODES 0

callback after building constraintnodes. Definition at line 43 of file hook.h.

Referenced by cnBuildNodes(), and hkInitialize().

5.8.2.15 #define HOOK_EVAL 1

callback after evaluation of constraints. Definition at line 48 of file hook.h.

Referenced by evalBinaryConstraint(), evalConstraint(), evalUnaryConstraint(), hkInitialize(), and hooker_init().

5.8.2.16 #define HOOK_FLUSH 4

callback for flushing the output channels. Definition at line 63 of file hook.h.

Referenced by cdgFlush(), hkInitialize(), hooker_init(), and logFlush().

5.8.2.17 #define HOOK_GETS 7

callback in to get a string from the user. Definition at line 79 of file hook.h.

Referenced by cdgGetString(), hkInitialize(), and hooker_init().

5.8.2.18 #define HOOK_GLSINTERACTION 6

callback for user interaction in the gls module. Definition at line 74 of file hook.h.

Referenced by hkInitialize(), and hooker_init().

5.8.2.19 #define HOOK_ICINTERACTION 10

callback for user interaction in the incrementalcompletion module. Definition at line 94 of file hook.h.

Referenced by hkInitialize(), and hooker_init().

5.8.2.20 #define HOOK_NSSEARCH 2

callback in netsearching. Definition at line 53 of file hook.h.

Referenced by hkInitialize(), and hooker_init().

5.8.2.21 #define HOOK_PARTIALRESULT 9

callback to hand over partial results. Definition at line 89 of file hook.h.

Referenced by hkInitialize(), and hooker_init().

5.8.2.22 #define HOOK_PRINTF 3

callback for printfing. Definition at line 58 of file hook.h.

Referenced by cdgPrintf(), hkInitialize(), hooker_init(), logFlush(), and logPrintf().

5.8.2.23 #define HOOK_PROGRESS 8

callback to indicate progress in a heavy computation. Definition at line 84 of file hook.h.

Referenced by cdgPrintf(), hkInitialize(), and hooker_init().

5.8.2.24 #define HOOK_RESET 5

notification that parses, constraint nets etc. have become invalid because of grammar changes. Definition at line 69 of file hook.h.

Referenced by cdgDeleteComputed(), hkInitialize(), and hooker_init().

5.8.3 Typedef Documentation

5.8.3.1 typedef HookStruct* Hook

type of a Hook Definition at line 216 of file hook.h.

Referenced by cdgExecHook(), cdgFlush(), cdgGetString(), cdgPrintf(), cmdHook(), evalHookHandle(), getHookCmd(), getsHookHandle(), glsInteractionHookHandle(), hkFindNoOfHook(), hkInitialize(), hook_completion_function(), hooker_init(), ICinteractionHookHandle(), initHookResult(), logFlush(), netsearchHookHandle(), partialResultHookHandle(), progressHookHandle(), resetHookHandle(), setHookCmd(), and tclHookHandle().

5.8.3.2 typedef void HookFunction()

type of a callback function. This function is installed into a callback hook and executed whenever this callback is triggered. This is only a indicator definition without any grants on the arguments. But be aware of the arguments that are actually needed by every callback. Definition at line 201 of file hook.h.

Referenced by hkInitialize(), and hooker_init().

5.8.4 Function Documentation

5.8.4.1 void cdgExecHook (int *hookNo*, ...)

execute a defined callback. This is the standard way to call a hook. If the corresponding HookStruct::active is set, its HookStruct::count is increased and its HookStruct::function is called handing over a pointer to the HookStruct we are executing and the entire va_list passed to this function. For example, `cdgExecHook(HOOK_PARTIALRESULT, parse)` is executing `HookStruct::function(hook, parse)`.

Parameters:

hookNo the identifier of the hook to be called, e.g. HOOK_PROGRESS

Definition at line 306 of file hook.c.

References HookStruct::active, CDG_ERROR, cdgPrintf(), HookStruct::count, HookStruct::function, hkHooks, Hook, and HookStruct::name.

Referenced by cdgDeleteComputed(), cnBuildNodes(), evalBinaryConstraint(), evalConstraint(), and evalUnaryConstraint().

5.8.4.2 void cdgFlush (void)

default flush callback. This is the default callback for HOOK_FLUSH. If no hook is installed, i.e. HookStruct::function is NULL, then `fflush` is called. In addition writeXmlFlush() is called to sync the CDG_XML output channel. Definition at line 454 of file hook.c.

References HookStruct::count, HookStruct::function, hkHooks, Hook, and HOOK_FLUSH.

Referenced by cdgPrintf(), cnBuildEdges(), cnBuildIter(), comApprove(), comMake(), commandEval(), and comTranslate().

5.8.4.3 void cdgGetString (String *buffer*, int *size*)

default get string callback. This function gets one newline-terminated chunk of console input from the user. Up to `size` characters are transferred into `buffer`. For this purpose, HOOK_GETS is executed. It this hook has no associated function, `fgets()` is called instead with an additional argument of `stdin`. This provides a transparent way of reading input from a user. (Note that the normal interaction with the shell of the cdgp parser uses a different and non-transparent input routine.) Definition at line 375 of file hook.c.

References HookStruct::count, HookStruct::function, hkHooks, Hook, and HOOK_GETS.

5.8.4.4 void cdgPrintf (int *mode*, String *format*, ...)

output channel router. This function takes care of routing messages to appropriate output channels. The first argument `mode` defines bitwise the channels this message is to be routed to. The rest of the arguments is passed to the HOOK_PRINTF in printf mannor (so see the manual pages for printf). We use HOOK_PROGRESS exclusive here when the hkVerbosity contains the CDG_PROGRESS flag and only HOOK_PRINTF otherwise. If we are producing xml output and the CDG_WARNING or CDG_ERROR channel is used, then the message doubled according to the cdg-logfile.dtd by writeXmlVaNotification(). Definition at line 403 of file hook.c.

References CDG_ERROR, CDG_PROGRESS, CDG_WARNING, cdgFlush(), HookStruct::count, HookStruct::function, hkHooks, hkVerbosity, Hook, HOOK_PRINTF, HOOK_PROGRESS, and NULL.

Referenced by bPrint(), cdgAgInsert(), cdgDeleteComputed(), cdgExecHook(), chunkerChunk(), chunkerCommandValidate(), chunkerNew(), chunkerPrintChunks(), cmdAnno2Parse(), cmdAnnos2prolog(), cmdAnnotation(), cmdChunk(), cmdCompareParses(), cmdCompile(), cmdConstraint(), cmdDistance(), cmdEdges(), cmdHelp(), cmdHierarchy(), cmdHook(), cmdIncrementalCompletion(), cmdInputwordgraph(), cmdISearch(), cmdLevel(), cmdLevelsort(), cmdLexicon(), cmdLicense(), cmdLoad(), cmdLs(), cmdNet(), cmdNetdelete(), cmdNetsearch(), cmdNewnet(), cmdNonSpecCompatible(), cmdParsedelete(), cmdParses2prolog(), cmdPrintParse(), cmdPrintParses(), cmdRenewnet(), cmdReset(), cmdSection(), cmdSet(), cmdShowlevel(), cmdStatus(), cmdTagger(), cmdTesting(), cmdUseconstraint(), cmdUselevel(), cmdUseLexicon(), cmdVerify(), cmdVersion(), cmdWeight(), cmdWordgraph(), cmdWriteAnno(), cmdWriteNet(), cmdWriteParses(), cmdWriteWordgraph(), cnBuild(), cnBuildEdges(), cnBuildFinal(), cnBuildLv(), cnBuildNodes(), cnBuildUpdateArcs(), cnCallback(), cnDelete(), cnFindNode(), cnOptimizeNet(), cnOptimizeNode(), cnPrint(), cnPrintActiveLVs(), cnPrintEdge(), cnPrintInfo(), cnPrintNode(), cnPrintParses(), cnSortNodes(), cnTag(), cnUnaryPruning(), comApprove(), comCompareAllLvPairs(), comCompareAllLvs(), comCompareLvs(), comCompareNets(), comCompareWithContext(), comCompile(), comFinitGrammar(), comInitGrammar(), comLoad(), comMake(), commandEval(), commandLoop(), computeNoOfPathsFromStart(), computeNoOfPathsToEnd(), comTranslate(), cvAnalyse(), cvPrint(), dbAvailable(), dbClose(), dbGetEntries(), dbLoad(), dbLoadAll(), dbLoadEntries(), dbOpen(), dbOpen-

IndexFile(), embedChunk(), evalBinary(), evalBinaryConstraint(), evalChunker(), evalConstraint(), evalFormula(), evalTerm(), evalUnary(), evalUnaryConstraint(), evalValidateEvalMethod(), findChunk(), getCategories(), getCategory(), getChunks(), getFakeChunksAt(), getNextArgument(), initChunker(), initFakeChunker(), initRealChunker(), lgAreDeletableNodes(), lgCompatibleNodes(), lgDeleteNode(), lgDeleteNodes(), lgDistanceOfNodes(), lgMostProbablePath(), lgNewFinal(), lgNewIter(), lgPartitions(), lgPrint(), lgPrintNode(), lgSimultaneous(), mergeChunk(), parseGetGrapheme(), peekValue(), postProcessChunks(), printChunk(), scSetScore(), smDelete(), smGetFlag(), smGetScore(), smSetAllFlags(), smSetFlag(), smSetScore(), terminateChild(), timerElapsed(), and unlock_tree().

5.8.4.5 void hkCallback (String *name*, Boolean * *var*)

monitor access to variables in this module.

This function is installed using setRegister() in the hkInitialize() function of this module. When a variable is changed hkCallback() is called handling appropriate sideeffects depending on the new variable value. Right now only the variable `xml` is handled here.

Switching on `xml` writes an appropriate xml header to the CDG_XML channel. Switching off `xml` finishes all open xml tags. See the write module for more information on the xml output channel. Definition at line 141 of file hook.c.

Referenced by hkInitialize().

5.8.4.6 void hkFinalize (void)

finalization of this module. After this call the `CDG` library is nearly shut down. That's why this finalizer is to be called at last after calling the finalizer of all other modules. Definition at line 286 of file hook.c.

References hkHooks.

Referenced by cdgFinalize().

5.8.4.7 int hkFindNoOfHook (String *name*)

get the numerical identifier of a named hook.

Parameters:

name the name of a known hook

Returns:

the numerical identifier on success or -1 of no hook of that name exists.

Definition at line 347 of file hook.c.

References FALSE, hkHooks, Hook, and HookStruct::name.

Referenced by cmdHook(), getHookCmd(), and setHookCmd().

5.8.4.8 void hkInitialize (void)

initialization of the hook module. This function must be called before the `CDG` library is functional. Definition at line 156 of file hook.c.

References HookStruct::active, CDG_DEBUG, CDG_DEFAULT, CDG_ERROR, CDG_EVAL, CDG_HINT, CDG_INFO, CDG_PROFILE, CDG_PROGRESS, CDG_PROLOG, CDG_SEARCHRESULT,

CDG_WARNING, CDG_XML, HookStruct::cmd, HookStruct::count, FALSE, HookStruct::function, hkCallback(), hkHooks, hkValidate(), hkVerbosity, Hook, HOOK_CNBUILDNODES, HOOK_EVAL, HOOK_FLUSH, HOOK_GETS, HOOK_GLSINTERACTION, HOOK_ICINTERACTION, HOOK_NSSEARCH, HOOK_PARTIALRESULT, HOOK_PRINTF, HOOK_PROGRESS, HOOK_RESET, HookFunction, HookStruct::name, HookStruct::no, NULL, and TRUE.

Referenced by cdgInitialize().

5.8.4.9 Boolean hkValidate (String *name*, String *value*, Boolean * *var*)

validate access to variables in this module.

This function is installed using setRegister() in the hkInitialize() function of this module. It is monitoring the access to the variable `xml` being registered in hkInitialize(). Definition at line 113 of file hook.c.

References FALSE, and TRUE.

Referenced by hkInitialize().

5.8.5 Variable Documentation

5.8.5.1 Vector hkHooks

This Vector holds all defined hooks. It is initialized by the function hkInitialize(). After that, the symbolic constants can be used to execute any of the hooks. Definition at line 88 of file hook.c.

Referenced by cdgExecHook(), cdgFlush(), cdgGetString(), cdgPrintf(), cmdHook(), getHookCmd(), hkFinalize(), hkFindNoOfHook(), hkInitialize(), hook_completion_function(), hooker_init(), logFlush(), logPrintf(), and setHookCmd().

5.8.5.2 Vector hkHooks = NULL

This Vector holds all defined hooks. It is initialized by the function hkInitialize(). After that, the symbolic constants can be used to execute any of the hooks. Definition at line 88 of file hook.c.

Referenced by cdgExecHook(), cdgFlush(), cdgGetString(), cdgPrintf(), cmdHook(), getHookCmd(), hkFinalize(), hkFindNoOfHook(), hkInitialize(), hook_completion_function(), hooker_init(), logFlush(), logPrintf(), and setHookCmd().

5.8.5.3 unsigned long int hkVerbosity

bitwise encoding of active output channels.

This variable controls the currently active output channels. All output is performed by the function cdgPrintf(), whose first argument is a bitwise encoding denoting the output channels (e.g. CDG_INFO, CDG_ERROR, or CDG_DEBUG output) to which a message is to be routed.

All messages tagged with a bit that is not set in `hkVerbosity` are suppressed. Definition at line 101 of file hook.c.

Referenced by cdgPrintf(), cmdHook(), cmdNetsearch(), cmdStatus(), cnBuildNodes(), cnPrintInfo(), cnSortNodes(), cnTag(), comApprove(), commandEval(), dbLoadEntries(), evalBinaryConstraint(), evalConstraint(), evalUnaryConstraint(), and hkInitialize().

5.8.5.4 unsigned long int hkVerbosity = CDG_DEFAULT | CDG_ERROR | CDG_INFO | CDG_WARNING | CDG_SEARCHRESULT

bitwise encoding of active output channels.

This variable controls the currently active output channels. All output is performed by the function cdgPrintf(), whose first argument is a bitwise encoding denoting the output channels (e.g. CDG_INFO, CDG_ERROR, or CDG_DEBUG output) to which a message is to be routed.

All messages tagged with a bit that is not set in `hkVerbosity` are suppressed. Definition at line 101 of file hook.c.

Referenced by cdgPrintf(), cmdHook(), cmdNetsearch(), cmdStatus(), cnBuildNodes(), cnPrintInfo(), cnSortNodes(), cnTag(), comApprove(), commandEval(), dbLoadEntries(), evalBinaryConstraint(), evalConstraint(), evalUnaryConstraint(), and hkInitialize().

5.9 Hook - A callback system

5.9.1 Detailed Description

Author:
Michael Schulz

Modules

- group HookCore - C Part in the core system
- group HookBindings - Adaptor to the callback system

5.10 Lexemgraph - maintainance of lexem graphs

5.10.1 Detailed Description

Author:
Ingo Schroeder (see also AUTHORS and THANKS for more)

Date:
1997-03-04

Id
lexemgraph.c,v 1.140 2004/09/27 17:07:05 micha Exp

Id
lexemgraph.h,v 1.68 2004/09/01 14:01:31 micha Exp

Functions

- long long computeNoOfPathsFromStart (LexemGraph lg, GraphemNode gn, long long sofar, long long maximal)
- long long computeNoOfPathsToEnd (LexemGraph lg, GraphemNode gn, long long sofar, long long maximal)
- GraphemNode gnClone (GraphemNode gn, Lattice lat)
- Boolean lgAreDeletableNodes (LexemGraph lg, List lexemes)
- Boolean lgAreDeletedNodes (LexemGraph lg, List lexemes)
- LexemGraph lgClone (LexemGraph lg)
- Boolean lgCompatibleNodes (LexemGraph lg, LexemNode a, LexemNode b)
- Boolean lgCompatibleSets (LexemGraph lg, List a, List b)
- void lgComputeDistances (LexemGraph lg)
- void lgComputeNoOfPaths (LexemGraph lg)
- Boolean lgContains (LexemGraph lg, String form)
- Boolean lgCopySelection (LexemGraph destination, LexemGraph source)
- void lgCopyTagScores (LexemGraph destination, LexemGraph source)
- void lgDelete (LexemGraph lg)
- void lgDeleteNode (LexemGraph lg, LexemNode ln)
- void lgDeleteNodes (LexemGraph lg, List nodes)
- int lgDistanceOfNodes (LexemGraph lg, LexemNode a, LexemNode b)
- Boolean lgForbiddenBy (LexemGraph lg, LexemNode ln, List lexemes)
- void lgInitialize ()
- Boolean lgIntersectingSets (List a, List b)
- Boolean lgIsDeletedNode (LexemGraph lg, LexemNode ln)
- Boolean lgIsEndNode (GraphemNode n)
- Boolean lgIsStartNode (GraphemNode n)
- Boolean lgLexemeInLexemNodeList (LexiconItem le, List list)
- List lgMakePath (LexemGraph lg, List nodes)
- Boolean lgMayModify (LexemGraph lg, GraphemNode down, GraphemNode up)
- Boolean lgMember (LexemNode ln, List lexemes)
- List lgMostProbablePath (LexemGraph lg)
- LexemGraph lgNew (Lattice lat)
- Boolean lgNewFinal (LexemGraph lg)
- LexemGraph lgNewInit ()

- Boolean lgNewIter (LexemGraph lg, Arc arc)
- Boolean lgOverlap (LexemNode a, LexemNode b)
- List lgPartitions (GraphemNode gn, BitString features)
- void lgPrint (long unsigned int mode, LexemGraph lg)
- void lgPrintNode (unsigned long mode, LexemNode ln)
- List lgQueryCat (LexemGraph lg, GraphemNode gn)
- void lgRequireLexeme (LexemGraph lg, ByteVector v, LexemNode ln)
- void lgRequireLexemes (LexemGraph lg, ByteVector v, List which)
- Boolean lgSimultaneous (LexemNode a, LexemNode b)
- Boolean lgSpuriousUppercase (LexemGraph lg, Arc arc)
- Boolean lgSubset (List a, List b)
- Boolean lgUpdateArcs (LexemGraph lg, Lattice lat, List listArcs)
- int lgWidth (LexemGraph lg)

Variables

- Boolean lgCompactLVs = TRUE

5.10.2 Function Documentation

5.10.2.1 long long computeNoOfPathsFromStart (LexemGraph *lg*, GraphemNode *gn*, long long *sofar*, long long *maximal*)

computes LexemGraph::noOfPathsFromStart

This function computes the number of paths leading to *gn* from the start of *lg*. If *gn* corresponds to a start node, this is simply the number of lexeme nodes sprung from *gn*. Otherwise it is that number multiplied by the sum of the numbers of paths leading from the start to immediately preceding grapheme nodes. If *gn* is deleted, the number is always zero. Definition at line 128 of file lexemgraph.c.

References GraphemNodeStruct::arc, CDG_ERROR, cdgPrintf(), GraphemNode, LexemGraphStruct::graphemnodes, GraphemNodeStruct::live, LexemGraphStruct::min, GraphemNodeStruct::no, and LexemGraphStruct::noOfPathsFromStart.

Referenced by lgComputeNoOfPaths().

5.10.2.2 long long computeNoOfPathsToEnd (LexemGraph *lg*, GraphemNode *gn*, long long *sofar*, long long *maximal*)

computes LexemGraph::noOfPathsToEnd

This function computes the number of paths leading from *gn* to the end of *lg*. If *gn* corresponds to an end node, this is simply the number of lexeme nodes sprung from *g*. Otherwise it is that number multiplied by the sum of the numbers of paths leading to the end from immediately following grapheme nodes. If *gn* is deleted, the number is always zero. Definition at line 180 of file lexemgraph.c.

References GraphemNodeStruct::arc, CDG_ERROR, cdgPrintf(), GraphemNode, LexemGraphStruct::graphemnodes, GraphemNodeStruct::live, LexemGraphStruct::max, GraphemNodeStruct::no, and LexemGraphStruct::noOfPathsToEnd.

Referenced by lgComputeNoOfPaths().

5.10.2.3 GraphemNode gnClone (GraphemNode *gn*, Lattice *lat*)

Clone a grapheme node.

The field GraphemNode::lexemes is not set; the caller has to do that. (The two-way links between grapheme nodes and lexeme nodes can be set easier when all nodes are known.) Definition at line 1713 of file lexemgraph.c.

References GraphemNodeStruct::arc, GraphemNodeStruct::chunk, GraphemNode, GraphemNodeStruct::lexemes, GraphemNodeStruct::lexemgraph, GraphemNodeStruct::no, and NULL.

Referenced by lgClone().

5.10.2.4 Boolean lgAreDeletableNodes (LexemGraph *lg*, List *lexemes*)

This function checks whether all lexeme nodes passed in *lexemes* can be deleted at the same time. This is the case if doing so will leave at least one complete path though the lexeme graph, according to the current state of deletions. For this end, the function checks whether the sum of the number of paths through each lexeme node is smaller than the total number of paths in *lg*.

Precondition:

lexemes must be a List of lexeme nodes with identical time spans. If this is not the case, the behaviour is undefined.

Definition at line 979 of file lexemgraph.c.

References CDG_ERROR, cdgPrintf(), GraphemNode, LexemGraphStruct::isDeletedNode, GraphemNodeStruct::lexemes, LexemNode, LexemNodeStruct::no, GraphemNodeStruct::no, LexemGraphStruct::noOfPaths, LexemGraphStruct::noOfPathsFromStart, LexemGraphStruct::noOfPathsToEnd, NULL, and TRUE.

Referenced by cnOptimizeNode().

5.10.2.5 Boolean lgAreDeletedNodes (LexemGraph *lg*, List *lexemes*)

This checks if the *lexemes* have been deleted TRUE is returned, if not FALSE Definition at line 957 of file lexemgraph.c.

References FALSE, LexemNode, lgIsDeletedNode(), NULL, and TRUE.

Referenced by cnBuildIter(), cnOptimizeNode(), cnPrint(), and lgComputeDistances().

5.10.2.6 LexemGraph lgClone (LexemGraph *lg*)

Clone a lexeme graph.

This performs a totally deep copy; even the underlying lattice, lexicon items etc. are cloned. Definition at line 1735 of file lexemgraph.c.

References LexemNodeStruct::arc, LexemGraphStruct::chunks, LexemGraphStruct::distance, gnClone(), LexemNodeStruct::grapheme, GraphemNode, LexemGraphStruct::graphemnodes, LexemGraphStruct::isDeletedNode, LexemGraphStruct::lattice, LexemNodeStruct::lexem, LexemNode, lgComputeDistances(), lgComputeNoOfPaths(), lgCopyTagScores(), LexemNodeStruct::limit, LexemGraphStruct::max, LexemGraphStruct::min, LexemNodeStruct::no, GraphemNodeStruct::no, LexemGraphStruct::nodes, LexemGraphStruct::noOfPathsFromStart, LexemGraphStruct::noOfPathsToEnd, and NULL.

5.10.2.7 Boolean lgCompatibleNodes (LexemGraph *lg*, LexemNode *a*, LexemNode *b*)

returns TRUE if lexem nodes a and b exist on one path.

This function checks whether, in principle, a complete path can exist through *lg* that includes both *a* and *b*. This is independent of the current state of deletions. In fact, the function merely checks whether the distance between the nodes is not 0 by using lgDistanceOfNodes(). Note that two nodes are not automatically compatible merely because they do not overlap in time. Also, a lexeme node is not compatible with itself by this definition. Definition at line 847 of file lexemgraph.c.

References CDG_ERROR, cdgPrintf(), LexemNode, lgDistanceOfNodes(), and NULL.

Referenced by cnOptimizeNode(), lgCompatibleSets(), lgForbiddenBy(), lgMakePath(), lgRequireLexeme(), and lgRequireLexemes().

5.10.2.8 Boolean lgCompatibleSets (LexemGraph *lg*, List *a*, List *b*)

checks if these sets of lexemes are compatible, i.e. either unrelated or intersecting?

Precondition:

Both *a* and *b* must be Lists of lexeme nodes spanning the same respective time interval. If this is not the case, the behaviour is undefined.

This function checks whether both sets of lexeme nodes may be selected in a solution. This is defined as follows:

- If either set is empty, the result is TRUE
- If the first elements of *a* and *b* are compatible, the result is TRUE
- If the sets intersect, the result is TRUE
- Otherwise the result is FALS

Definition at line 903 of file lexemgraph.c.

References LexemNodeStruct::arc, FALSE, LexemNode, lgCompatibleNodes(), NULL, and TRUE.

5.10.2.9 void lgComputeDistances (LexemGraph *lg*)

(re-)computes the distance matrix LexemGraph::distance

This function computes the distance between any two lexeme nodes in *lg* and stores the result in *lg->distance*. Definition at line 56 of file lexemgraph.c.

References GraphemNodeStruct::arc, LexemGraphStruct::distance, GraphemNode, LexemGraphStruct::graphemnodes, GraphemNodeStruct::lexemes, and lgAreDeletedNodes().

Referenced by cnRenew(), lgClone(), lgDeleteNode(), lgDeleteNodes(), and lgNewFinal().

5.10.2.10 void lgComputeNoOfPaths (LexemGraph *lg*)

computes # of paths possible in the graph, given the current state of deletions.

This function computes the number of paths possible in *lg*, according to the state of its Vector LexemGraph::isDeletedNode. It calls computeNoOfPathsToEnd() and computeNoOfPathsFromStart() for each

lexeme node. The total number of all paths is the sum of all numbers of paths leading to grapheme nodes that are end nodes. Definition at line 232 of file lexemgraph.c.

References GraphemNodeStruct::arc, computeNoOfPathsFromStart(), computeNoOfPathsToEnd(), FALSE, GraphemNode, LexemGraphStruct::graphemnodes, LexemGraphStruct::isDeletedNode, GraphemNodeStruct::lexemes, LexemNode, GraphemNodeStruct::live, LexemGraphStruct::min, LexemNodeStruct::no, GraphemNodeStruct::no, LexemGraphStruct::nodes, LexemGraphStruct::noOfPaths, LexemGraphStruct::noOfPathsFromStart, LexemGraphStruct::noOfPathsToEnd, NULL, and TRUE.

Referenced by cnRenew(), lgClone(), lgDeleteNode(), lgDeleteNodes(), and lgNewFinal().

5.10.2.11 Boolean lgContains (LexemGraph *lg*, String *form*)

Does a lexemgraph contain at least one instance of a given form?

This function checks whether *lg* contains at least one instance of the form *form*. Capitalized versions of *form* are permissible if they are spurious (cf. lgSpuriousUppercase()). Definition at line 1657 of file lexemgraph.c.

References GraphemNodeStruct::arc, FALSE, GraphemNode, LexemGraphStruct::graphemnodes, lgSpuriousUppercase(), and TRUE.

5.10.2.12 Boolean lgCopySelection (LexemGraph *destination*, LexemGraph *source*)

Select the path in DST whose parts most closely match SRC.

This function inspects the undeleted words in *source* and undeletes those words in *destination* that most closely correspond to them. (This is necessary because two lexeme graphs built from the same lattice may have their nodes in different order, so you cannot simply re-use an LexemGraph::isDeletedNode vector across lexeme graphs.) Definition at line 1569 of file lexemgraph.c.

References LexemNodeStruct::arc, FALSE, LexemGraphStruct::isDeletedNode, LexemNodeStruct::lexem, LexemNode, LexemNodeStruct::no, LexemGraphStruct::nodes, NULL, and TRUE.

5.10.2.13 void lgCopyTagScores (LexemGraph *destination*, LexemGraph *source*)

This function simply transfers the field LexemGraph::tagscore from each node in *source* to the corresponding node in *destination*. (This is only useful to save repeated invocation of taggerTag() for two graphs produced from the same lattice.) Definition at line 1498 of file lexemgraph.c.

References Chunk, GraphemNodeStruct::chunk, chunkerCloneChunk(), chunkerReplaceGraphemes(), LexemGraphStruct::chunks, GraphemNode, LexemNode, ChunkStruct::nodes, LexemGraphStruct::nodes, NULL, ChunkStruct::subChunks, LexemGraphStruct::tags, and LexemNodeStruct::tagscore.

Referenced by lgClone().

5.10.2.14 void lgDelete (LexemGraph *lg*)

deletes LexemGraph

This function deallocates a lexeme graph. This deallocates all parts of the structure, even the lexeme nodes and lexical entries themselves. The lexicon remains unchanged as the LexicalEntry structures are merely clones of the structures in inputCurrentGrammar. Definition at line 1313 of file lexemgraph.c.

References chunkerChunkDelete(), LexemGraphStruct::chunks, LexemGraphStruct::distance, GraphemNode, LexemGraphStruct::graphemnodes, LexemGraphStruct::isDeletedNode, LexemNodeStruct::lexem,

GraphemNodeStruct::lexemes, LexemNode, LexemGraphStruct::nodes, LexemGraphStruct::noOfPaths-FromStart, LexemGraphStruct::noOfPathsToEnd, NULL, and LexemGraphStruct::tags.

Referenced by cmdAnno2Parse(), cmdChunk(), cnDelete(), and lgNew().

5.10.2.15 void lgDeleteNode (LexemGraph *lg*, LexemNode *ln*)

deletes a node from the lexeme graph itself.

This function marks a lexeme node as deleted. It does this by setting the cell *ln->no* in the Vector *lg->isDeletedNode*. If this destroys the last possible path through *lg=*, a warning is displayed. This function always re-computes the number of remaining paths in *lg*. Definition at line 1045 of file lexemgraph.c.

References CDG_WARNING, cdgPrintf(), LexemGraphStruct::isDeletedNode, LexemNodeStruct::lexem, LexemNode, lgComputeDistances(), lgComputeNoOfPaths(), LexemNodeStruct::no, LexemGraph-Struct::noOfPaths, and TRUE.

Referenced by cnOptimizeNode().

5.10.2.16 void lgDeleteNodes (LexemGraph *lg*, List *nodes*)

delete a list of lexeme nodes

This function behaves as lgDeleteNode() were called on each element of the *nodes*, but it is more efficient since it only re-computes the number of remaining paths once. Definition at line 1075 of file lexemgraph.c.

References CDG_WARNING, cdgPrintf(), LexemGraphStruct::isDeletedNode, LexemNodeStruct::lexem, LexemNode, lgComputeDistances(), lgComputeNoOfPaths(), LexemNodeStruct::no, LexemGraph-Struct::noOfPaths, NULL, and TRUE.

Referenced by cnOptimizeNode().

5.10.2.17 int lgDistanceOfNodes (LexemGraph *lg*, LexemNode *a*, LexemNode *b*)

returns a distance measure for two lexem nodes

This function computes the logical distance between *a* and *b*, measured in words. Usually this is just the corresponding element of LexemGraph::distance. If either of the nodes is underspecified it is treated as if it followed the latest specified lexeme node directly. Hence, the return value may be greater than value in LexemGraph::distance. Two underspecified lexeme nodes are considered to have distance zero. Definition at line 776 of file lexemgraph.c.

References CDG_ERROR, cdgPrintf(), LexemGraphStruct::distance, LexemNodeStruct::grapheme, LexemNode, GraphemNodeStruct::no, and NULL.

Referenced by cmdDistance(), lgCompatibleNodes(), and lgMayModify().

5.10.2.18 Boolean lgForbiddenBy (LexemGraph *lg*, LexemNode *ln*, List *lexemes*)

does existence of these lexemes exclude that lexeme.

Precondition:

lexemes must be a List of lexeme nodes with identical time spans. If this is not the case, the behaviour is undefined.

This function checks whether the List *lexemes* and the lexeme node *ln* can be selected in a solution. This is the case if either of the following holds:

- *lexemes* is empty
- *ln* is compatible with the first element of *lexemes*
- *lexemes* contains *ln*

In these cases FALSE is returned (*ln* is not forbidden). Otherwise TRUE is returned. Definition at line 872 of file lexemgraph.c.

References FALSE, LexemNode, lgCompatibleNodes(), and TRUE.

5.10.2.19 void lgInitialize ()

Initialize the input module.

This function initializes the module Lexemgraph and registers the variable *compactlevelvalues*. Definition at line 1615 of file lexemgraph.c.

References lgCompactLVs, and NULL.

Referenced by cdgInitialize().

5.10.2.20 Boolean lgIntersectingSets (List *a*, List *b*)

Do two lexeme lists intersect.

Precondition:
Both *a* and *b* must be Lists of lexeme nodes spanning the same respective time interval. If this is not the case, the behaviour is undefined.

This function checks whether *a* and *b* intersect. Definition at line 1211 of file lexemgraph.c.

References FALSE, LexemNode, lgSimultaneous(), NULL, and TRUE.

5.10.2.21 Boolean lgIsDeletedNode (LexemGraph *lg*, LexemNode *ln*)

This checks if a lexem node has been deleted TRUE is returned, if not FALSE. Definition at line 947 of file lexemgraph.c.

References LexemGraphStruct::isDeletedNode, LexemNode, and LexemNodeStruct::no.

Referenced by cnOptimizeNode(), lgAreDeletedNodes(), and lgMakePath().

5.10.2.22 Boolean lgIsEndNode (GraphemNode *n*)

returns TRUE if node is an end node

This function checks whether `n->arc->to` is equal to the maximal time point in the lexeme graph.

Todo
should nodes on segment boundaries of incremental parsed input be considered to be endnodes

Definition at line 758 of file lexemgraph.c.

References GraphemNodeStruct::arc, FALSE, GraphemNode, GraphemNodeStruct::lexemgraph, LexemGraphStruct::max, and NULL.

Referenced by cnIsEndNode().

5.10.2.23 Boolean lgIsStartNode (GraphemNode *n*)

returns TRUE if node is a start node

This function checks whether `n->arc->from` is equal to the minimal time point in the lexeme graph. Definition at line 741 of file lexemgraph.c.

References GraphemNodeStruct::arc, FALSE, GraphemNode, GraphemNodeStruct::lexemgraph, LexemGraphStruct::min, and NULL.

Referenced by cnIsStartNode().

5.10.2.24 Boolean lgLexemeInLexemNodeList (LexiconItem *le*, List *list*)

This function checks whether at least one of the LexemNode structures in *list* points to a lexicon element *le* Definition at line 1549 of file lexemgraph.c.

References FALSE, LexemNodeStruct::lexem, LexemNode, NULL, and TRUE.

5.10.2.25 List lgMakePath (LexemGraph *lg*, List *nodes*)

Takes a set of lexeme nodes, and extends it to a complete path through the graph, composed of undeleted LexemNodes. Returns NULL if this is impossible, It returns a List of lexeme nodes that

1. is a superset of *nodes*
2. corresponds to a complete path through the graph and
3. contains only undeleted lexeme nodes.

If this is not possible, NULL is returned.

We do this by simply appending arbitrary non-contradictory nodes until we have bound all time points. Note that for this approach to be correct, there must not be any undeleted dangling nodes in the graph. This condition must have ensured by cnOptimizeNet(). Definition at line 1250 of file lexemgraph.c.

References LexemNodeStruct::arc, FALSE, LexemNode, lgCompatibleNodes(), lgIsDeletedNode(), LexemGraphStruct::max, LexemGraphStruct::min, LexemGraphStruct::nodes, NULL, and TRUE.

5.10.2.26 Boolean lgMayModify (LexemGraph *lg*, GraphemNode *down*, GraphemNode *up*)

may these words modify each other?

Precondition:

lexemes must be a List of lexeme nodes with identical time spans. If this is not the case, the behaviour is undefined.

This function checks whether an LevelValue can exist with the modifiers *exemes* and a modifiee from *gn*. This is the case iff both can coexist on one path and do not overlap. Definition at line 824 of file lexemgraph.c.

References GraphemNode, GraphemNodeStruct::lexemes, LexemNode, lgDistanceOfNodes(), and TRUE.

Referenced by cnBuildLevelValues().

5.10.2.27 Boolean lgMember (LexemNode *ln*, List *lexemes*)

is this lexeme a member of the this set?

Precondition:
lexemes must be a List of lexeme nodes with identical time spans. If this is not the case, the behaviour is undefined.

This function checks whether *ln* is an element of *lexemes*.

In the following cases *ln* is not a member (return FALSE);

- a NIL binding (*ln* is NULL) is not an element of anything
- an empty set (*lexemes* is NULL) has no member,
- *ln* belongs to another timespan
- *ln* is not contained litteraly in the set

Otherwise TRUE is returned. Definition at line 1152 of file lexemgraph.c.

References FALSE, LexemNode, lgSimultaneous(), and NULL.

Referenced by lgSubset().

5.10.2.28 List lgMostProbablePath (LexemGraph *lg*)

Returns the most probable path, as defined by tagging scores. Definition at line 1676 of file lexemgraph.c.

References CDG_WARNING, cdgPrintf(), GraphemNode, LexemGraphStruct::graphemnodes, LexemGraphStruct::lattice, GraphemNodeStruct::lexemes, LexemNode, NULL, and LexemNode-Struct::tagscore.

5.10.2.29 LexemGraph lgNew (Lattice *lat*)

This function creates a lexeme graph from a Lattice *lat* and a cdg lexicon. For each arcs of the lattice a grapheme node is allocated and annotated with all possible lexical entries. (If there is no lexical entry for an arc, a warning is given, but processing continues.)

For each grapheme node, as many lexeme nodes are created as there are lexical alternatives in the lexicon.

Furthermore:

- LexemGraph::isDeletedNode is initialized to FALSE
- LexemGraph::noOfPathsFromStart and LexemGraph::noOfPathsFromStart=are computed using computeNoOfPaths().
- LexemGraph::distance is computed using lgComputeDistances().

Definition at line 685 of file lexemgraph.c.

References LexemGraphStruct::lattice, lgDelete(), lgNewFinal(), lgNewInit(), lgNewIter(), and NULL.

Referenced by cmdAnno2Parse(), cmdChunk(), and cnTag().

5.10.2.30 Boolean lgNewFinal (LexemGraph *lg*)

does the final computations for the lexemgraph

This function sets those fields of *lg* that can only be computed after all lexeme nodes are present:

- It initializes LexemGraph::isDeletedNode to all FALSE.
- It uses lgComputeDistances() to compute the distance between any to nodes in the graph.
- It applies lgComputeNoOfPaths() to compute the number of paths to and from all lexeme nodes in the graph. If no complete path exists, *lg* is deallocated with a warning.

The function can fail returning FALSE if there is no valid path through the lexeme graph. Definition at line 618 of file lexemgraph.c.

References CDG_INFO, CDG_WARNING, cdgPrintf(), FALSE, LexemGraphStruct::graphemnodes, LexemGraphStruct::isDeletedNode, LexemGraphStruct::lattice, lgComputeDistances(), lgComputeNoOfPaths(), lgPrint(), LexemGraphStruct::max, LexemGraphStruct::noOfPaths, NULL, LexemGraphStruct::tags, and TRUE.

Referenced by lgNew(), and lgUpdateArcs().

5.10.2.31 LexemGraph lgNewInit ()

initializes the lexemgraph

This function returns a new LexemGraph structure with all fields initialized to meaningless values. In particular, it contains no nodes whatsoever. Definition at line 427 of file lexemgraph.c.

References LexemGraphStruct::chunks, LexemGraphStruct::distance, LexemGraphStruct::graphemnodes, LexemGraphStruct::isDeletedNode, LexemGraphStruct::lattice, LexemGraphStruct::max, LexemGraphStruct::min, LexemGraphStruct::nodes, LexemGraphStruct::noOfPathsFromStart, LexemGraphStruct::noOfPathsToEnd, NULL, and LexemGraphStruct::tags.

Referenced by lgNew().

5.10.2.32 Boolean lgNewIter (LexemGraph *lg*, Arc *arc*)

Insert lexeme nodes into the LexemGraph that correspond the Arc.

This function builds all possible lexeme nodes for the specific *arc* and adds them to *lg*. It fails if there is no matching entry in the lexicon.

Maybe undo capitalisation introduced by orthographic convention.

If the written word is uppercase, but that uppercase-ness is suspect because it is at the start of a phrase and might be mere orthographic convention, we have to decide which version we use for lexicon lookup.

If our lexicon contains items for the lower-case version but none for the upper-case versions, we use only those; if it contains only items for the upper-case version, we use those; and if it contains neither, we allow both and hope that there is a lexical template which will catch this word.

We do not use the obvious solution - look up both versions whenever a word is spurious - because it has the following defect: If a sentence starts with ‘Der’, some naive lexical template could introduce a noun reading, and if POS tagging allows, it might actually survive even though it is exceedingly unlikely. Since we do not want this, we effectively force the reading to be ‘der’.

Moral: If you really need to have open-class items in your lexicon that are near-homonymous with closed-class items, you can bloody well write proper lexicon items for them and not templates.

Much the same goes for words in ALL UPPER CAPS, except that those can occur anywhere in a sentence, not only at the start, and we have to check three different spellings instead of two.

In one-letter words, the intermediate version is indistinguishable from the third one, so we suppress it. Definition at line 454 of file lexemgraph.c.

References GraphemNodeStruct::arc, LexemNodeStruct::arc, CDG_WARNING, cdgPrintf(), GraphemNodeStruct::chunk, FALSE, LexemNodeStruct::grapheme, GraphemNode, LexemGraphStruct::graphemnodes, LexemGraphStruct::isDeletedNode, LexemNodeStruct::lexem, GraphemNodeStruct::lexemes, GraphemNodeStruct::lexemgraph, LexemNodeStruct::lexemgraph, LexemNode, lgSpuriousUppercase(), LexemNodeStruct::limit, LexemGraphStruct::max, max, LexemGraphStruct::min, min, GraphemNodeStruct::no, LexemNodeStruct::no, LexemGraphStruct::nodes, NULL, LexemNodeStruct::tagscore, and TRUE.

Referenced by lgNew(), and lgUpdateArcs().

5.10.2.33 Boolean lgOverlap (LexemNode *a*, LexemNode *b*)

Do these lexeme nodes overlap?

Returns TRUE if the two lexeme nodes have at least one time point in common.

This is subtly different from the more common question, "Can the two nodes coexist on one path?": two nodes can be compatible although they overlap if they are identical. Conversely, a and b may be incompatible even if they do not overlap if there is no path between them. Definition at line 1416 of file lexemgraph.c.

References LexemNodeStruct::arc, and LexemNode.

5.10.2.34 List lgPartitions (GraphemNode *gn*, BitString *features*)

partitions a set of lexeme nodes into equivalence classes

This function partitions the set of lexeme nodes of *gn* into equivalence classes. The equivalence relation used is the function inputCompareLeByAtts() with the argument *features*. The function returns a new List of new lists of lexemes. (The latter are re-used in ConstraintNode structures, the former are deallocated by cnBuildNodes().)

```
result = [];

FOR each lexeme l:
 IF l fits into one of the known classes,
  insert l there;
 ELSE
  create new class [lexem];
  insert the new class into result;
 FI
ROF

return result.
```

Definition at line 306 of file lexemgraph.c.

References CDG_DEBUG, cdgPrintf(), GraphemNode, LexemNodeStruct::lexem, GraphemNodeStruct::lexemes, LexemNode, lgCompactLVs, and NULL.

Referenced by cnBuildLevelValues().

5.10.2.35 void lgPrint (long unsigned int *mode*, LexemGraph *lg*)

print lexem graph

This function displays a textual representation of the lexeme graph *lg*. Definition at line 708 of file lexemgraph.c.

References LexemNodeStruct::arc, cdgPrintf(), chunkerPrintChunks(), LexemGraphStruct::chunks, LexemGraphStruct::isDeletedNode, LexemGraphStruct::lattice, LexemNodeStruct::lexem, LexemNode, lgPrint(), LexemNodeStruct::no, LexemGraphStruct::nodes, and LexemNodeStruct::tagscore.

Referenced by lgNewFinal(), and lgPrint().

5.10.2.36 void lgPrintNode (unsigned long *mode*, LexemNode *ln*)

prints out a lexeme node

This function displays the identifier and the time span of *ln* in the format `der_nom(0,1)`. Definition at line 1395 of file lexemgraph.c.

References LexemNodeStruct::arc, cdgPrintf(), LexemGraphStruct::isDeletedNode, LexemNodeStruct::lexem, LexemNodeStruct::lexemgraph, LexemNode, and LexemNodeStruct::no.

Referenced by cnOptimizeNode().

5.10.2.37 List lgQueryCat (LexemGraph *lg*, GraphemNode *gn*)

What categories can this node represent? (Needed while tagging.).

This function queries the lexicon about what syntactical categories *gn* can represent. (The syntactical category is that feature whose index is taggerCategoryIndex.) This function is used to check whether an assignment by the tagger can be honored by the lexicon. Definition at line 1629 of file lexemgraph.c.

References GraphemNode, LexemNodeStruct::lexem, GraphemNodeStruct::lexemes, LexemNode, and NULL.

5.10.2.38 void lgRequireLexeme (LexemGraph *lg*, ByteVector *v*, LexemNode *ln*)

Takes a Vector of Boolean, and sets all cells that correspond to the numbers of nodes incompatible with ln. This function can be used in combination with lvVectorCompatible() to decide whether an LV is compatible with a set of other LVs. Definition at line 1428 of file lexemgraph.c.

References LexemNode, lgCompatibleNodes(), LexemNodeStruct::no, LexemGraphStruct::nodes, and TRUE.

5.10.2.39 void lgRequireLexemes (LexemGraph *lg*, ByteVector *v*, List *which*)

This function is similar to lgRequireLexeme(), but takes a List of lexeme nodes. It marks all those lexeme nodes that are incompatible with all lexemnodes of *which*. Definition at line 1449 of file lexemgraph.c.

References LexemNode, lgCompatibleNodes(), LexemNodeStruct::no, LexemGraphStruct::nodes, and TRUE.

5.10.2.40 Boolean lgSimultaneous (LexemNode *a*, LexemNode *b*)

do the lexemes span the same time interval?

This function checks whether *a* and *b* cover the same time span. An argument of NONSPEC always causes TRUE to be returned. However, the NULL node is not simultaneous to any lexeme node, not even to another root node. Definition at line 1108 of file lexemgraph.c.

References LexemNodeStruct::arc, CDG_WARNING, cdgPrintf(), FALSE, LexemNodeStruct::lexem, LexemNode, NULL, and TRUE.

Referenced by lgIntersectingSets(), lgMember(), and lgSubset().

5.10.2.41 Boolean lgSpuriousUppercase (LexemGraph *lg*, Arc *arc*)

Might this be a lowercase word that is spelled in upper case because of orthographic convention?

Spurious uppercase must be an upper case letter...

... followed by a lower case letter.

This is another instance of the "wordgraphs start at 0" assumption.

Ordinarily, this would be wrong, since the lexeme graph might start at some other time point. However, at this time lg->min may not be initialized, so we can't check it. Since spurious upper case only occurs in written text, and weird time points occur mainly in recognizer output for spoken text, I'm letting it pass here. Definition at line 1785 of file lexemgraph.c.

References FALSE, LexemGraphStruct::lattice, and TRUE.

Referenced by lgContains(), and lgNewIter().

5.10.2.42 Boolean lgSubset (List *a*, List *b*)

This function checks whether *a* is a subset of *b*.

Precondition:

Both *a* and *b* must be Lists of lexeme nodes spanning the same respective time interval. If this is not the case, the behaviour is undefined.

Definition at line 1173 of file lexemgraph.c.

References FALSE, LexemNode, lgMember(), lgSimultaneous(), NULL, and TRUE.

5.10.2.43 Boolean lgUpdateArcs (LexemGraph *lg*, Lattice *lat*, List *listArcs*)

updates the partial lexemgraph with the incoming arcs.

This function extends a lexeme graph by the Arc structures contained in *listArcs*. Definition at line 1476 of file lexemgraph.c.

References LexemGraphStruct::distance, LexemGraphStruct::lattice, lgNewFinal(), lgNewIter(), and NULL.

5.10.2.44 int lgWidth (LexemGraph *lg*)

Returns:

maximal ambiguity per time point

This function computes the maximal number of overlapping lexeme nodes for any time point in *lg*. Thus it gives an upper bound (not an estimate) of the average acoustical and lexical ambiguity of the graph. Definition at line 1362 of file lexemgraph.c.

References LexemNodeStruct::arc, LexemNode, LexemGraphStruct::max, and LexemGraphStruct::nodes.

5.10.3 Variable Documentation

5.10.3.1 Boolean lgCompactLVs = TRUE

This variable controls whether the levelvalues should be deflated if they are equivalent. Usually, we want this switched on, only for testing a value of FALSE might be appropriate. Definition at line 48 of file lexemgraph.c.

Referenced by cmdStatus(), lgInitialize(), and lgPartitions().

5.11 Scache - Cache structures for binary LV scores

5.11.1 Detailed Description

Author:
Michael Schulz

Date:
somewhen in 1998

A score cache serves much the same purpose as the score matrices in the edges of a constraint net, except that it can be used even if the constraint net has no edges in it. This simply means that the binary score of a pair of LVs will be computed when it is used for the first time rather than upon initializing the net.

Data Structures

- struct ScoreCacheStruct

Defines

- #define DEBUG_SCORECACHE 0
- #define indexOfPair(x, y) ((x<y) ? (((y∗(y-1))>>1)+x) : (((x∗(x-1))>>1)+y))

Typedefs

- typedef ScoreCacheStruct ∗ ScoreCache

Functions

- void scDelete (ScoreCache cache)
- Number scGetScore (ScoreCache cache, LevelValue a, LevelValue b)
- void scInitialize ()
- ScoreCache scNew (int noValues)
- void scSetScore (ScoreCache cache, LevelValue a, LevelValue b, Number score)

Variables

- Boolean scUseCache
- Boolean scUseCache = FALSE

5.11.2 Define Documentation

5.11.2.1 #define DEBUG_SCORECACHE 0

debug flag Definition at line 41 of file scache.c.

5.11.2.2 #define indexOfPair(x, y) ((x<y) ? (((y*(y-1))>>1)+x) : (((x*(x-1))>>1)+y))

determines the index of a given pair Definition at line 39 of file scache.c.

Referenced by scGetScore(), scNew(), and scSetScore().

5.11.3 Typedef Documentation

5.11.3.1 typedef ScoreCacheStruct* ScoreCache

Pointer to ScoreCacheStruct Definition at line 45 of file scache.h.

Referenced by scDelete(), scGetScore(), scNew(), and scSetScore().

5.11.4 Function Documentation

5.11.4.1 void scDelete (ScoreCache *cache*)

free memory from a cache

This function deallocates a cache. Definition at line 88 of file scache.c.

References ScoreCacheStruct::data, and ScoreCache.

Referenced by cnDelete(), cnRenew(), comCompareAllLvPairs(), and comCompareWithContext().

5.11.4.2 Number scGetScore (ScoreCache *cache*, LevelValue *a*, LevelValue *b*)

retrieve score from cache if available, else return -1.0

This function returns the mutual score for the LVs **a** and **b** from the score. If it is not yet known, -1 is returned. Definition at line 102 of file scache.c.

References ScoreCacheStruct::data, ScoreCacheStruct::hits, indexOfPair, ScoreCache, and ScoreCacheStruct::size.

Referenced by evalBinary().

5.11.4.3 void scInitialize ()

initialize the module **Scache**. It registers the module's CDG variables. Definition at line 216 of file scache.c.

References NULL, and scUseCache.

Referenced by cdgInitialize().

5.11.4.4 ScoreCache scNew (int *size*)

return an initial score-cache

This function returns a pointer to a new cache. The fields **count** and **hits** are initialized to 0. All elements of the underlying Vector are set to -1. Definition at line 62 of file scache.c.

References ScoreCacheStruct::capacity, ScoreCacheStruct::count, ScoreCacheStruct::data, ScoreCacheStruct::hits, indexOfPair, ScoreCache, and ScoreCacheStruct::size.

Referenced by cnBuildFinal(), cnRenew(), comCompareAllLvPairs(), and comCompareWithContext().

5.11.4.5 void scSetScore (ScoreCache *cache*, LevelValue *a*, LevelValue *b*, Number *score*)

store score in cache

This function registers a binary score in the cache. It behaves as follows:

- If **cache** is **NULL** the function returns.
- If either of the LVs still has its **no** set to -1, **registerValue()** is applied to it.
- A unique index is computed from the fields **no** of both LVs.
- The underlying Vector is resize if necessary.
- **score** is entered in the corresponding cell.

Definition at line 137 of file scache.c.

References ScoreCacheStruct::capacity, CDG_DEBUG, CDG_ERROR, cdgPrintf(), ScoreCacheStruct::count, ScoreCacheStruct::data, indexOfPair, ScoreCache, and ScoreCacheStruct::size.

Referenced by evalBinary().

5.11.5 Variable Documentation

5.11.5.1 Boolean scUseCache

implements the CDG variable **cache**. If this flag is set, binary constraints are never evaluated twice on the same pair of LVs. The function evalBinary() will then simply call scGetScore() instead of evalConstraint().

This variable is exported because it's cheaper for the calling function to check a boolean variable than calling a cache function which does nothing again and again. Definition at line 53 of file scache.c.

Referenced by cmdIncrementalCompletion(), cmdStatus(), cnBuildFinal(), cnRenew(), comCompareAllLvPairs(), comCompareWithContext(), evalBinary(), and scInitialize().

5.11.5.2 Boolean scUseCache = FALSE

implements the CDG variable **cache**. If this flag is set, binary constraints are never evaluated twice on the same pair of LVs. The function evalBinary() will then simply call scGetScore() instead of evalConstraint().

This variable is exported because it's cheaper for the calling function to check a boolean variable than calling a cache function which does nothing again and again. Definition at line 53 of file scache.c.

Referenced by cmdIncrementalCompletion(), cmdStatus(), cnBuildFinal(), cnRenew(), comCompareAllLvPairs(), comCompareWithContext(), evalBinary(), and scInitialize().

5.12 Scorematrix - The matrix of scores appearing in each ConstraintEdge

5.12.1 Detailed Description

Author:
Ingo Schroeder

Date:
6/3/97

Note: The functions for accessing these matrices check whether the matrix is non- **NULL**, but they do not check whether the index is meaningful. Hence the behaviour of these functions is undefined if an invalid array index is passed to them.

Data Structures

- struct ScoreMatrixStruct
- struct SMEntryStruct

Typedefs

- typedef ScoreMatrixStruct * ScoreMatrix
- typedef ScoreMatrixStruct ScoreMatrixStruct
- typedef SMEntryStruct * SMEntry
- typedef SMEntryStruct SMEntryStruct

Functions

- void smDelete (ScoreMatrix sm)
- Boolean smGetFlag (ScoreMatrix sm, int r, int c)
- double smGetScore (ScoreMatrix sm, int r, int c)
- ScoreMatrix smNew (int r, int c)
- void smSetAllFlags (ScoreMatrix sm, Boolean flag)
- Boolean smSetFlag (ScoreMatrix sm, Boolean flag, int r, int c)
- double smSetScore (ScoreMatrix sm, double score, int r, int c)

5.12.2 Typedef Documentation

5.12.2.1 typedef struct ScoreMatrixStruct* ScoreMatrix

type of matrix structure pointer Definition at line 27 of file scorematrix.h.

Referenced by smDelete(), smGetFlag(), smGetScore(), smNew(), smSetAllFlags(), smSetFlag(), and smSetScore().

5.12.2.2 typedef struct ScoreMatrixStruct ScoreMatrixStruct

type of score matrix structure Definition at line 81 of file scorematrix.c.

Referenced by smNew().

5.12.2.3 typedef SMEntryStruct* SMEntry

type of matrix entry pointer Definition at line 54 of file scorematrix.c.

Referenced by smNew().

5.12.2.4 typedef struct SMEntryStruct SMEntryStruct

type of matrix entry structure Definition at line 51 of file scorematrix.c.

Referenced by smNew().

5.12.3 Function Documentation

5.12.3.1 void smDelete (ScoreMatrix *sm*)

deletes score matrix

This function deallocates a **ScoreMatrix**. It first deallocates all elements of **sm->entries[]** and then the array itself as well as the **ScoreMatrixStruct**. Definition at line 122 of file scorematrix.c.

References CDG_ERROR, cdgPrintf(), ScoreMatrixStruct::cols, ScoreMatrixStruct::entries, NULL, ScoreMatrixStruct::rows, and ScoreMatrix.

Referenced by cnBuildEdges(), and cnDeleteEdge().

5.12.3.2 Boolean smGetFlag (ScoreMatrix *sm*, int *r*, int *c*)

retrieves a score matrix element flag

Returns:
the **flag** of the specified element.

Definition at line 211 of file scorematrix.c.

References CDG_ERROR, cdgPrintf(), ScoreMatrixStruct::entries, SMEntryStruct::flag, NULL, ScoreMatrixStruct::rows, and ScoreMatrix.

5.12.3.3 double smGetScore (ScoreMatrix *sm*, int *r*, int *c*)

retrieves a score matrix element score Definition at line 197 of file scorematrix.c.

References CDG_ERROR, cdgPrintf(), ScoreMatrixStruct::entries, NULL, ScoreMatrixStruct::rows, SMEntryStruct::score, and ScoreMatrix.

Referenced by cnPrintEdge().

5.12.3.4 ScoreMatrix smNew (int *r*, int *c*)

creates and returns a new score matrix

This function allocates a new **ScoreMatrix** and returns a pointer to it. It allocates an array of size **r** * **c** . All elements are initialized to pairs of the form **(0.0, FALSE)** . Definition at line 94 of file scorematrix.c.

References ScoreMatrixStruct::cols, ScoreMatrixStruct::entries, FALSE, SMEntryStruct::flag, ScoreMatrixStruct::rows, SMEntryStruct::score, ScoreMatrix, ScoreMatrixStruct, SMEntry, and SMEntryStruct.

Referenced by cnBuildEdges().

5.12.3.5 void smSetAllFlags (ScoreMatrix *sm*, Boolean *f*)

sets flags of all matrix elements to a new value

This function sets the **flag** of all elements of **sm**->**entries**[] to **flag**. Definition at line 180 of file scorematrix.c.

References CDG_ERROR, cdgPrintf(), ScoreMatrixStruct::cols, ScoreMatrixStruct::entries, SMEntryStruct::flag, NULL, ScoreMatrixStruct::rows, and ScoreMatrix.

5.12.3.6 Boolean smSetFlag (ScoreMatrix *sm*, Boolean *f*, int *r*, int *c*)

sets a flag matrix element to a new value, returns old value Definition at line 159 of file scorematrix.c.

References CDG_ERROR, cdgPrintf(), ScoreMatrixStruct::entries, SMEntryStruct::flag, NULL, ScoreMatrixStruct::rows, and ScoreMatrix.

Referenced by cnBuildEdges().

5.12.3.7 double smSetScore (ScoreMatrix *sm*, double *d*, int *r*, int *c*)

sets a score matrix element to a new value, returns old value Definition at line 141 of file scorematrix.c.

References CDG_ERROR, cdgPrintf(), ScoreMatrixStruct::entries, NULL, ScoreMatrixStruct::rows, SMEntryStruct::score, and ScoreMatrix.

Referenced by cnBuildEdges().

5.13 Skel - A Skeleton Module

5.13.1 Detailed Description

Author:
your name

Date:
date of birth

Demonstration of the current coding style and blueprint for new modules.

This module demonstrates how a module for the CDG typically looks like. In addition it serves as a rough demonstration of some of the doxygen capabilities. See skel.h and skel.c for the sources of this documentation.

Note, that most of the documentation of a module should be placed into its implementations file (e.g. skel.c) and only the documentation of exported data structures (e.g. MyExportedType) and exported macros are left in the declatrations file (e.g. skel.h). So avoid rendundant documentation of functions and stuff in both places.

Data Structures

- struct MyExportedTypeStruct
- struct MyPrivateTypeStruct

Defines

- #define SOMEMACRO

Typedefs

- typedef MyExportedTypeStruct * MyExportedType
- typedef MyPrivateTypeStruct * MyPrivateType

Functions

- int myExportedFunction (int a, int b)
- int myPrivateFunction (int a, int b)

Variables

- int MyExportedTypeStruct::memberA
- int MyExportedTypeStruct::memberB
- int myExportedVariable
- int myExportedVariable
- int myPrivateVariable

5.13.2 Define Documentation

5.13.2.1 #define SOMEMACRO

short description Definition at line 28 of file skel.h.

5.13.3 Typedef Documentation

5.13.3.1 typedef MyExportedTypeStruct* MyExportedType

type definition Definition at line 40 of file skel.h.

5.13.3.2 typedef MyPrivateTypeStruct* MyPrivateType

type definition Definition at line 52 of file skel.c.

5.13.4 Function Documentation

5.13.4.1 int myExportedFunction (int *a*, int *b*)

short description. long description

Parameters:

a comments on *a*

b comments on *b*

Returns:

the result

Definition at line 86 of file skel.c.

References myExportedVariable.

5.13.4.2 int myPrivateFunction (int *a*, int *b*) [inline, static]

short description. long description

Parameters:

a comments on *a*

b comments on *b*

Returns:

the result

Definition at line 74 of file skel.c.

References myPrivateVariable.

5.13.5 Variable Documentation

5.13.5.1 MyExportedTypeStruct::memberA [inherited]

short description. long description.

5.13.5.2 MyExportedTypeStruct::memberB [inherited]

short description. long description.

5.13.5.3 int myExportedVariable

short description. long description Definition at line 57 of file skel.c.

Referenced by myExportedFunction().

5.13.5.4 int myExportedVariable

short description. long description Definition at line 57 of file skel.c.

Referenced by myExportedFunction().

5.13.5.5 int myPrivateVariable [static]

short description. This variable is private to this module Definition at line 60 of file skel.c.

Referenced by myPrivateFunction().

5.14 Timer - timekeeping functions

5.14.1 Detailed Description

Author:
Michael Schulz

Date:
somewhen in 1998

This module exports functions for measuring the time spent in various parts of the application. The time measured is always user time + kernel time.

Defines

- #define MyMAXLONG ((long)~(1L << ((8 * (int)sizeof(long)) - 1)))

Typedefs

- typedef timeval TimerStruct * Timer
- typedef clock_t TimerFast

Functions

- void expire (int n)
- unsigned long timerElapsed (Timer timer)
- unsigned long timerElapsedFast (TimerFast timer)
- void timerFree (Timer timer)
- void timerInitialize (void)
- Timer timerNew (void)
- void timerSetAlarm (long unsigned int limit)
- void timerStart (Timer timer)
- TimerFast timerStartFast (void)
- void timerStopAlarm (void)

Variables

- double timerClockTicks = -1
- Boolean timerExpired
- Boolean timerExpired

5.14.2 Define Documentation

5.14.2.1 #define MyMAXLONG ((long)~(1L << ((8 * (int)sizeof(long)) - 1)))

a local macro to define the maximal long value Definition at line 28 of file timer.h.

5.14.3 Typedef Documentation

5.14.3.1 typedef struct timeval TimerStruct* Timer

the slow timer Definition at line 32 of file timer.h.

Referenced by cmdChunk(), cmdIncrementalCompletion(), cmdISearch(), cmdNewnet(), cnBuildEdges(), cnBuildNodes(), timerElapsed(), timerFree(), timerNew(), and timerStart().

5.14.3.2 typedef clock_t TimerFast

the fast timer Definition at line 31 of file timer.h.

Referenced by timerElapsedFast(), and timerStartFast().

5.14.4 Function Documentation

5.14.4.1 void expire (int *n*) [static]

Signal handler for when timer expires.

this function sets **timerexpired**. Definition at line 156 of file timer.c.

References timerExpired, and TRUE.

Referenced by timerSetAlarm().

5.14.4.2 unsigned long timerElapsed (Timer *timer*)

Return milliseconds elapsed since last timerStart() on this timer.

this function returns the difference between the time used so far and a time determined earlier by **timerstart()** in milliseconds. Definition at line 130 of file timer.c.

References CDG_ERROR, cdgPrintf(), and Timer.

Referenced by cmdChunk(), cmdIncrementalCompletion(), cmdISearch(), cmdNewnet(), cnBuildEdges(), cnBuildNodes(), comApprove(), comCompareAllLvPairs(), and comCompareWithContext().

5.14.4.3 unsigned long timerElapsedFast (TimerFast *timer*)

return milliseconds elapsed since last timerStartFast

this function returns the difference between the time used so far and a time determined earlier by **timerstartfast()** in milliseconds. Definition at line 72 of file timer.c.

References timerClockTicks, and TimerFast.

5.14.4.4 void timerFree (Timer *timer*)

frees the timer memory

this function deallocates a **timer**. Definition at line 116 of file timer.c.

References NULL, and Timer.

Referenced by cmdChunk(), cmdIncrementalCompletion(), cmdISearch(), cmdNewnet(), cnBuildEdges(), cnBuildNodes(), and comFreeApprover().

5.14.4.5 void timerInitialize (void)

timerInitialize

this function stops any alarms pending and initializes the variable **timerclockticks**. Definition at line 244 of file timer.c.

References timerClockTicks, and timerStopAlarm().

Referenced by cdgInitialize().

5.14.4.6 Timer timerNew (void)

allocates memory for the timer and calls timerStart Definition at line 103 of file timer.c.

References Timer, and timerStart().

Referenced by cmdChunk(), cmdIncrementalCompletion(), cmdISearch(), cmdNewnet(), cnBuildEdges(), cnBuildNodes(), and comNewApprover().

5.14.4.7 void timerSetAlarm (long unsigned int *limit*)

Set an alarm-clock that will set the flag timerExpired after "limit" milliseconds.

this function sets a time limit for the completion of a task. after **limit** milliseconds the variable **timerexpired** is asynchronously set to∼1 by **expire()**. this can be used as follows:

\/ build lvs for one second *\/*

void fastbuildvalues(constraintnet net, leveldecl level, ConstraintNode cn, List modifiers) {

*LexemNode modifiee; * LevelValue lv;*

int i; List l; String label;

timerSetAlarm(1000);

for (i = 0; i < vectorSize(net->lexemgraph->nodes); i++) { modifiee = (LexemNode) vectorElement(net->lexemgraph->nodes, i)

for (l = level->labels; l != NULL; l = l->next) { label = (String) l->item;

lv = lvNew(modifiers, level, label, modifiee); vectorAddElement(node->values, lv); }

if(timerExpired) { break; }

}

} Definition at line 204 of file timer.c.

References expire(), FALSE, NULL, and timerExpired.

Referenced by cmdFrobbing(), and cmdShift().

5.14.4.8 void timerStart (Timer *timer*)

Store number of cycles elapsed since program start (user + system) in timer.

This function performs a call to **getrusage()** and fills the corresponding fields in the **Timer** structure. Definition at line 88 of file timer.c.

References NULL, and Timer.

Referenced by comApprove(), comCompareAllLvPairs(), comCompareWithContext(), and timerNew().

5.14.4.9 TimerFast timerStartFast (void)

return clocks elapse since program start (user + system)

this function returns the time used so far by the process, as computed by the system function **clock()=**. Definition at line 61 of file timer.c.

References TimerFast.

5.14.4.10 void timerStopAlarm (void)

stop the alarm clock

This function cancels the alarm set by **timerSetAlarm()**. Definition at line 229 of file timer.c.

References FALSE, and timerExpired.

Referenced by cmdFrobbing(), cmdShift(), and timerInitialize().

5.14.5 Variable Documentation

5.14.5.1 double timerClockTicks = -1 [static]

initialized correctly in timerInitialize Definition at line 48 of file timer.c.

Referenced by timerElapsedFast(), and timerInitialize().

5.14.5.2 Boolean timerExpired

This variable **timerExpired=** is a flag to be set after a user-defined timespan has elapsed. Definition at line 46 of file timer.c.

Referenced by expire(), timerSetAlarm(), and timerStopAlarm().

5.14.5.3 Boolean timerExpired

This variable **timerExpired=** is a flag to be set after a user-defined timespan has elapsed. Definition at line 46 of file timer.c.

Referenced by expire(), timerSetAlarm(), and timerStopAlarm().

5.15 HookBindings - Adaptor to the callback system

5.15.1 Detailed Description

Todo

Please explain this module.

Data Structures

- struct HookResultStruct
- struct LoggerStruct

Typedefs

- typedef HookResultStruct * HookResult
- typedef LoggerStruct * Logger
- typedef int TclResultType

Enumerations

- enum HookResultType { **HTNone**, **HTInt**, **HTString**, **HTError** }

Functions

- TclResultType evalHookHandle (Hook hook, va_list ap)
- TclResultType getHookCmd (char *hookName)
- TclResultType getsHookHandle (Hook hook, String buffer, int size)
- TclResultType glsInteractionHookHandle (Hook hook, va_list ap)
- void hooker_init (Tcl_Interp *interp)
- TclResultType ICinteractionHookHandle (Hook hook, va_list ap)
- void initHookResult (Hook hook)
- TclResultType logFlush ()
- int loggerSize (int maxsize)
- TclResultType logPrintf (char *format, va_list ap)
- TclResultType logWrite (char *text)
- TclResultType logWriteChar (char c)
- TclResultType netsearchHookHandle (Hook hook, va_list ap)
- TclResultType partialResultHookHandle (Hook hook, va_list ap)
- TclResultType progressHookHandle (Hook hook, char *format, va_list ap)
- TclResultType resetHookHandle (Hook hook, va_list ap)
- TclResultType setHookCmd (char *hookName, char *cmd)
- TclResultType tclHookHandle (Hook hook, va_list ap)

Variables

- Tcl_Interp * hkInterp
- Tcl_Interp * hkInterp
- HookResult hkResult
- HookResult hkResult
- Logger logger

5.15.2 Typedef Documentation

5.15.2.1 typedef HookResultStruct* HookResult

type of a HookResult Definition at line 73 of file hooker.h.

Referenced by hooker_init().

5.15.2.2 typedef LoggerStruct* Logger

type of a Logger Definition at line 46 of file hooker.h.

Referenced by hooker_init().

5.15.2.3 typedef int TclResultType

tagging the tcl result type. This typedef is used to allow special typemaps in the swig interface. Definition at line 81 of file hooker.h.

Referenced by evalHookHandle(), getHookCmd(), getsHookHandle(), glsInteractionHookHandle(), ICinteractionHookHandle(), logFlush(), logPrintf(), logWrite(), logWriteChar(), netsearchHookHandle(), partialResultHookHandle(), progressHookHandle(), resetHookHandle(), setHookCmd(), and tclHookHandle().

5.15.3 Enumeration Type Documentation

5.15.3.1 enum HookResultType

type of HookResults. Definition at line 51 of file hooker.h.

5.15.4 Function Documentation

5.15.4.1 TclResultType evalHookHandle (Hook *hook*, va_list *ap*)

evalHookHandle: called inside evalConstraint when a constraint fails the constraint can be unary or binary; levelvalues are still assigned arg1 : constraint Definition at line 356 of file hooker.c.

References HookStruct::cmd, hkInterp, hkResult, Hook, initHookResult(), NULL, TclResultType, and HookResultStruct::type.

Referenced by hooker_init().

5.15.4.2 TclResultType getHookCmd (char * *hookName*)

getHookCmd: get the tcl-command of a named hook Definition at line 245 of file hooker.c.

References HookStruct::cmd, HookResultStruct::data, hkFindNoOfHook(), hkHooks, hkInterp, hkResult, HookResultStruct::hook, Hook, NULL, TclResultType, and HookResultStruct::type.

5.15.4.3 TclResultType getsHookHandle (Hook *hook*, String *buffer*, int *size*)

getsHookHandle: handle gets from within tcl Definition at line 426 of file hooker.c.

References HookStruct::cmd, hkInterp, hkResult, Hook, initHookResult(), NULL, TclResultType, and HookResultStruct::type.

Referenced by hooker_init().

5.15.4.4 TclResultType glsInteractionHookHandle (Hook *hook*, va_list *ap*)

glsInteractionHookHandle: called inside the gls-module when a interaction with the algorithm is desired arg1 : GlsNet glsNet arg2 : String message Definition at line 391 of file hooker.c.

References HookStruct::cmd, hkInterp, hkResult, Hook, initHookResult(), NULL, TclResultType, and HookResultStruct::type.

Referenced by hooker_init().

5.15.4.5 void hooker_init (Tcl_Interp * *interp*)

initialize the module when loading this stores the tcl-hooks cdgHooks Definition at line 67 of file hooker.c.

References LoggerStruct::buffer, HookStruct::cmd, evalHookHandle(), HookStruct::function, getsHookHandle(), glsInteractionHookHandle(), hkHooks, hkInterp, hkResult, Hook, HOOK_EVAL, HOOK_FLUSH, HOOK_GETS, HOOK_GLSINTERACTION, HOOK_ICINTERACTION, HOOK_NSSEARCH, HOOK_PARTIALRESULT, HOOK_PRINTF, HOOK_PROGRESS, HOOK_RESET, HookFunction, HookResult, ICinteractionHookHandle(), initHookResult(), logFlush(), Logger, logger, loggerSize(), logPrintf(), LoggerStruct::maxsize, netsearchHookHandle(), NULL, partialResultHookHandle(), progressHookHandle(), LoggerStruct::size, and tclHookHandle().

5.15.4.6 TclResultType ICinteractionHookHandle (Hook *hook*, va_list *ap*)

ICinteractionHookHandle: get another word from the IC textbox. Definition at line 512 of file hooker.c.

References HookStruct::cmd, hkInterp, hkResult, Hook, initHookResult(), NULL, TclResultType, and HookResultStruct::type.

Referenced by hooker_init().

5.15.4.7 void initHookResult (Hook *hook*) [static]

to be called by every hook. Definition at line 55 of file hooker.c.

References HookResultStruct::data, hkResult, HookResultStruct::hook, Hook, NULL, and HookResultStruct::type.

Referenced by evalHookHandle(), getsHookHandle(), glsInteractionHookHandle(), hooker_init(), ICinteractionHookHandle(), logFlush(), logWriteChar(), netsearchHookHandle(), partialResultHookHandle(), progressHookHandle(), resetHookHandle(), setHookCmd(), and tclHookHandle().

5.15.4.8 TclResultType logFlush ()

logFlush: flush the logwindow Definition at line 278 of file hooker.c.

References LoggerStruct::buffer, HookStruct::cmd, hkHooks, hkInterp, hkResult, Hook, HOOK_FLUSH, HOOK_PRINTF, initHookResult(), logger, NULL, LoggerStruct::size, TclResultType, and HookResultStruct::type.

Referenced by hooker_init(), and logWriteChar().

5.15.4.9 int loggerSize (int *maxsize*)

set the buffersize of the logger.

Parameters:
maxsize the size which to set the log buffer to.

Returns:
the old size of the log buffer.

Definition at line 134 of file hooker.c.

References LoggerStruct::buffer, logger, LoggerStruct::maxsize, and LoggerStruct::size.

Referenced by hooker_init().

5.15.4.10 TclResultType logPrintf (char * *format*, va_list *ap*)

logPrintf: print formated text into the logger Definition at line 268 of file hooker.c.

References hkHooks, hkResult, HookResultStruct::hook, HOOK_PRINTF, logWrite(), and TclResultType.

Referenced by hooker_init().

5.15.4.11 TclResultType logWrite (char * *text*)

logWrite: writes some text into the logger Definition at line 194 of file hooker.c.

References HookResultStruct::data, hkResult, logWriteChar(), TclResultType, and HookResultStruct::type.

Referenced by logPrintf().

5.15.4.12 TclResultType logWriteChar (char *c*)

write a char to the logger. This functions writes a single char and check if it is a specail char which should be escaped. Definition at line 153 of file hooker.c.

References LoggerStruct::buffer, HookResultStruct::data, hkResult, initHookResult(), logFlush(), logger, LoggerStruct::maxsize, NULL, LoggerStruct::size, TclResultType, and HookResultStruct::type.

Referenced by logWrite().

5.15.4.13 TclResultType netsearchHookHandle (Hook *hook*, va_list *ap*)

netsearchHookHandle: arg1: NetSearchState arg3: mode 1 - add rootnode 2 - solution node found 3 - add child 4 - add skipper 5 - widen searchspace 6 - closing open node Definition at line 319 of file hooker.c.

References HookStruct::cmd, hkInterp, hkResult, Hook, initHookResult(), NULL, TclResultType, and HookResultStruct::type.

Referenced by hooker_init().

5.15.4.14 TclResultType partialResultHookHandle (Hook *hook*, va_list *ap*)

partialResultHookHandle: order displaying of another Parse Definition at line 482 of file hooker.c.

References HookStruct::cmd, hkInterp, hkResult, Hook, initHookResult(), NULL, TclResultType, and HookResultStruct::type.

Referenced by hooker_init().

5.15.4.15 TclResultType progressHookHandle (Hook *hook*, char * *format*, va_list *ap*)

progressHookHandle: show progess messages in tcl Definition at line 452 of file hooker.c.

References HookStruct::cmd, hkInterp, hkResult, Hook, initHookResult(), NULL, TclResultType, and HookResultStruct::type.

Referenced by hooker_init().

5.15.4.16 TclResultType resetHookHandle (Hook *hook*, va_list *ap*)

Call the Tcl-specified command, with no arguments. Definition at line 540 of file hooker.c.

References HookStruct::cmd, hkInterp, hkResult, Hook, initHookResult(), NULL, TclResultType, and HookResultStruct::type.

5.15.4.17 TclResultType setHookCmd (char * *hookName*, char * *cmd*)

setHookCmd: set the tcl-command of a named hook Definition at line 217 of file hooker.c.

References HookStruct::cmd, hkFindNoOfHook(), hkHooks, hkInterp, Hook, initHookResult(), NULL, and TclResultType.

5.15.4.18 TclResultType tclHookHandle (Hook *hook*, va_list *ap*)

tclHookHandle: default tclHook-Handler arguments aren't used Definition at line 568 of file hooker.c.

References HookStruct::cmd, hkInterp, hkResult, Hook, initHookResult(), NULL, TclResultType, and HookResultStruct::type.

Referenced by hooker_init().

5.15.5 Variable Documentation

5.15.5.1 Tcl_Interp* hkInterp

pointer to the currently used tcl interpreter.

Todo

This pointer isn't needed for newer swigs.

Definition at line 39 of file hooker.c.

Referenced by evalHookHandle(), getHookCmd(), getsHookHandle(), glsInteractionHookHandle(), hooker_init(), ICinteractionHookHandle(), logFlush(), netsearchHookHandle(), partialResultHookHandle(), progressHookHandle(), resetHookHandle(), setHookCmd(), and tclHookHandle().

5.15.5.2 Tcl_Interp* hkInterp

pointer to the currently used tcl interpreter.

Todo

This pointer isn't needed for newer swigs.

Definition at line 39 of file hooker.c.

Referenced by evalHookHandle(), getHookCmd(), getsHookHandle(), glsInteractionHookHandle(), hooker_init(), ICinteractionHookHandle(), logFlush(), netsearchHookHandle(), partialResultHookHandle(), progressHookHandle(), resetHookHandle(), setHookCmd(), and tclHookHandle().

5.15.5.3 HookResult hkResult

typed hook result. This pointer is used in our special typemaps. Definition at line 50 of file hooker.c.

Referenced by evalHookHandle(), getHookCmd(), getsHookHandle(), glsInteractionHookHandle(), hooker_init(), ICinteractionHookHandle(), initHookResult(), logFlush(), logPrintf(), logWrite(), logWriteChar(), netsearchHookHandle(), partialResultHookHandle(), progressHookHandle(), resetHookHandle(), and tclHookHandle().

5.15.5.4 HookResult hkResult

typed hook result. This pointer is used in our special typemaps. Definition at line 50 of file hooker.c.

Referenced by evalHookHandle(), getHookCmd(), getsHookHandle(), glsInteractionHookHandle(), hooker_init(), ICinteractionHookHandle(), initHookResult(), logFlush(), logPrintf(), logWrite(), logWriteChar(), netsearchHookHandle(), partialResultHookHandle(), progressHookHandle(), resetHookHandle(), and tclHookHandle().

5.15.5.5 Logger logger [static]

the singelton Logger instance used in this module. Definition at line 44 of file hooker.c.

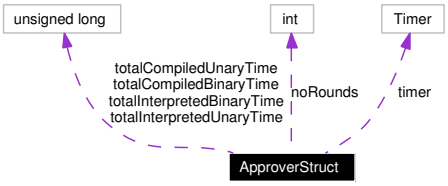
Referenced by hooker_init(), logFlush(), loggerSize(), and logWriteChar().

Chapter 6

CDG Data Structure Documentation

6.1 ApproverStruct Struct Reference

Collaboration diagram for ApproverStruct:



6.1.1 Detailed Description

definition of a approver object.

Definition at line 81 of file compile.c.

Data Fields

- int noRounds
- Timer timer
- unsigned long totalCompiledBinaryTime
- unsigned long totalCompiledUnaryTime
- unsigned long totalInterpretedBinaryTime
- unsigned long totalInterpretedUnaryTime

6.1.2 Field Documentation

6.1.2.1 int ApproverStruct::noRounds

no of times to eval all lv pairs Definition at line 82 of file compile.c.

Referenced by comCompareAllLvPairs(), comCompareWithContext(), and comNewApprover().

6.1.2.2 Timer ApproverStruct::timer

profiling Definition at line 83 of file compile.c.

Referenced by comApprove(), comCompareAllLvPairs(), comCompareWithContext(), comFreeApprover(), and comNewApprover().

6.1.2.3 unsigned long ApproverStruct::totalCompiledBinaryTime

profiling information Definition at line 87 of file compile.c.

Referenced by comApprove(), comCompareAllLvPairs(), comCompareWithContext(), and comNewApprover().

6.1.2.4 unsigned long ApproverStruct::totalCompiledUnaryTime

profiling information Definition at line 85 of file compile.c.

Referenced by comApprove(), and comNewApprover().

6.1.2.5 unsigned long ApproverStruct::totalInterpretedBinaryTime

profiling information Definition at line 86 of file compile.c.

Referenced by comApprove(), comCompareAllLvPairs(), comCompareWithContext(), and comNewApprover().

6.1.2.6 unsigned long ApproverStruct::totalInterpretedUnaryTime

profiling information Definition at line 84 of file compile.c.

Referenced by comApprove(), and comNewApprover().

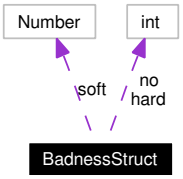
The documentation for this struct was generated from the following file:

- compile.c

6.2 BadnessStruct Struct Reference

`#include <eval.h>`

Collaboration diagram for BadnessStruct:



6.2.1 Detailed Description

Generalized score for comparing any two structures.

This structure counts both the total number of constraint violations (called 'conflicts' henceforth) and the number of hard conflicts (those with score 0.0). The field soft is the product of the penalties of all soft (non-zero) conflicts. Note that this structure allows different criteria for comparing two analyses; the function bCompare() is provided as one method, but others could be devised.

Definition at line 54 of file eval.h.

Data Fields

- int hard
- int no
- Number soft

6.2.2 Field Documentation

6.2.2.1 int BadnessStruct::hard

number of hard conflicts Definition at line 56 of file eval.h.

Referenced by bAdd(), bAddBadness(), bClone(), bCompare(), bEqual(), bNew(), bPrint(), bSubtract(), bSubtractBadness(), comCompareAllLvPairs(), and comCompareWithContext().

6.2.2.2 int BadnessStruct::no

number of conflicts Definition at line 55 of file eval.h.

Referenced by bAdd(), bAddBadness(), bClone(), bNew(), bPrint(), bSubtract(), bSubtractBadness(), comCompareAllLvPairs(), and comCompareWithContext().

6.2.2.3 Number BadnessStruct::soft

combined effect of soft conflicts Definition at line 57 of file eval.h.

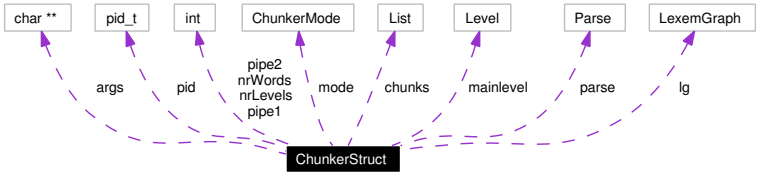
Referenced by bAdd(), bAddBadness(), bClone(), bCompare(), bEqual(), bNew(), bPrint(), bSubtract(), bSubtractBadness(), comCompareAllLvPairs(), and comCompareWithContext().

The documentation for this struct was generated from the following file:

- eval.h

6.3 ChunkerStruct Struct Reference

Collaboration diagram for ChunkerStruct:



6.3.1 Detailed Description

representation of the chunker.

Definition at line 55 of file chunker.c.

Data Fields

- char ** args
- List chunks
- LexemGraph lg
- Level mainlevel
- ChunkerMode mode
- int nrLevels
- int nrWords
- Parse parse
- pid_t pid
- int pipe1 [2]
- int pipe2 [2]

6.3.2 Field Documentation

6.3.2.1 char** ChunkerStruct::args

command to start this chunker

See also:
chunkerArgs

Definition at line 63 of file chunker.c.

Referenced by chunkerNew(), initRealChunker(), and resetChunker().

6.3.2.2 List ChunkerStruct::chunks

found chunks Definition at line 62 of file chunker.c.

Referenced by chunkerChunk(), chunkerNew(), evalChunker(), and resetChunker().

6.3.2.3 LexemGraph ChunkerStruct::lg

the current lexemgraph that we are chunking Definition at line 57 of file chunker.c.

Referenced by chunkerChunk(), chunkerNew(), getChunks(), initFakeChunker(), and resetChunker().

6.3.2.4 Level ChunkerStruct::mainlevel

mainlevels index in the current parse Definition at line 59 of file chunker.c.

Referenced by getFakeChunksAt(), initFakeChunker(), initRealChunker(), parseGetLabel(), parseGetLevelValue(), and parseGetModifiee().

6.3.2.5 ChunkerMode ChunkerStruct::mode

determines the mode of operation Definition at line 56 of file chunker.c.

Referenced by chunkerChunk(), chunkerNew(), and initChunker().

6.3.2.6 int ChunkerStruct::nrLevels

number of levels in the current parse Definition at line 61 of file chunker.c.

Referenced by chunkerNew(), initFakeChunker(), parseGetLabel(), parseGetModifiee(), and resetChunker().

6.3.2.7 int ChunkerStruct::nrWords

number of words in the current parse Definition at line 60 of file chunker.c.

Referenced by chunkerNew(), initFakeChunker(), parseGetRoots(), and resetChunker().

6.3.2.8 Parse ChunkerStruct::parse

parse generated from the annotation of the lattice Definition at line 58 of file chunker.c.

Referenced by chunkerNew(), getFakeChunksAt(), initFakeChunker(), parseGetLabel(), parseGetLevelValue(), parseGetModifiee(), and resetChunker().

6.3.2.9 pid_t ChunkerStruct::pid

process id of a started chunker job Definition at line 64 of file chunker.c.

Referenced by chunkerNew(), initRealChunker(), and resetChunker().

6.3.2.10 int ChunkerStruct::pipe1[2]

pipe connected to the stdin of the chunker process Definition at line 65 of file chunker.c.

Referenced by getChunks(), initRealChunker(), and resetChunker().

6.3.2.11 int ChunkerStruct::pipe2[2]

pipe connected to the stdout of the chunker process Definition at line 66 of file chunker.c.

Referenced by getChunks(), initRealChunker(), and resetChunker().

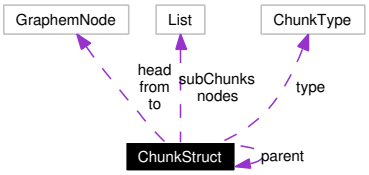
The documentation for this struct was generated from the following file:

- chunker.c

6.4 ChunkStruct Struct Reference

`#include <chunker.h>`

Collaboration diagram for ChunkStruct:



6.4.1 Detailed Description

internal representation of a chunk.

Definition at line 55 of file chunker.h.

Data Fields

- GraphemNode from
- GraphemNode head
- List nodes
- ChunkStruct * parent
- List subChunks
- GraphemNode to
- ChunkType type

6.4.2 Field Documentation

6.4.2.1 GraphemNode ChunkStruct::from

first element in the chunk Definition at line 58 of file chunker.h.

Referenced by chunkerCloneChunk(), chunkerReplaceGraphemes(), cmpChunks(), compareChunks(), embedChunk(), evalChunker(), evalTerm(), findChunk(), getChunks(), getFakeChunksAt(), mergeChunk(), newChunk(), and postProcessChunks().

6.4.2.2 GraphemNode ChunkStruct::head

head of the chunk Definition at line 60 of file chunker.h.

Referenced by chunkerCloneChunk(), chunkerReplaceGraphemes(), getChunks(), getFakeChunksAt(), newChunk(), and printChunk().

6.4.2.3 List ChunkStruct::nodes

list of all lexem nodes in the chunk Definition at line 57 of file chunker.h.

Referenced by chunkerChunk(), chunkerChunkDelete(), chunkerCloneChunk(), chunkerReplaceGraphemes(), embedChunk(), getChunks(), getFakeChunksAt(), lgCopyTagScores(), mergeChunk(), newChunk(), and printChunk().

6.4.2.4 struct ChunkStruct* ChunkStruct::parent

direct dominating span (only used in fake-chunking Definition at line 61 of file chunker.h.

Referenced by chunkerCloneChunk(), getFakeChunksAt(), and newChunk().

6.4.2.5 List ChunkStruct::subChunks

embedded chunks, e.g. [PC ... [NC ...]] Definition at line 62 of file chunker.h.

Referenced by chunkerChunk(), chunkerChunkDelete(), chunkerCloneChunk(), chunkerReplaceGraphemes(), compareChunks(), countChunks(), embedChunk(), findChunk(), getChunks(), lgCopyTagScores(), mergeChunk(), newChunk(), and printChunk().

6.4.2.6 GraphemNode ChunkStruct::to

last element in the chunk Definition at line 59 of file chunker.h.

Referenced by chunkerCloneChunk(), chunkerReplaceGraphemes(), compareChunks(), embedChunk(), evalChunker(), evalTerm(), findChunk(), getChunks(), getFakeChunksAt(), mergeChunk(), newChunk(), postProcessChunks(), and printChunk().

6.4.2.7 ChunkType ChunkStruct::type

label of the chunk Definition at line 56 of file chunker.h.

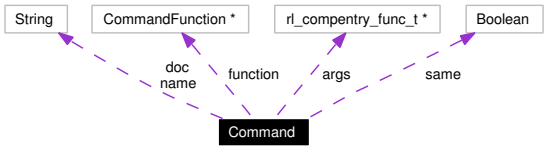
Referenced by chunkerCloneChunk(), chunkerStringOfChunkType(), compareChunks(), countChunks(), evalChunker(), getFakeChunksAt(), newChunk(), postProcessChunks(), and printChunk().

The documentation for this struct was generated from the following file:

- chunker.h

6.5 Command Struct Reference

Collaboration diagram for Command:



6.5.1 Detailed Description

command definition for the interface_commands.

Definition at line 166 of file command.c.

Data Fields

- rl_compentry_func_t * args [MAXARGNO]
- String doc
- CommandFunction * function
- String name
- Boolean same

6.5.2 Field Documentation

6.5.2.1 rl_compentry_func_t* Command::args[MAXARGNO]

array of completion functions for each argument Definition at line 170 of file command.c.

Referenced by interface_completion().

6.5.2.2 String Command::doc

little help text Definition at line 177 of file command.c.

6.5.2.3 CommandFunction* Command::function

function that implements the command Definition at line 172 of file command.c.

Referenced by commandEval().

6.5.2.4 String Command::name

the name of the command Definition at line 168 of file command.c.

Referenced by cmdHelp(), command_completion_function(), commandEval(), and interface_-completion().

6.5.2.5 Boolean Command::same

completion flag. This is set to 1 for those commands which use the same completion-function for all of their arguments Definition at line 174 of file command.c.

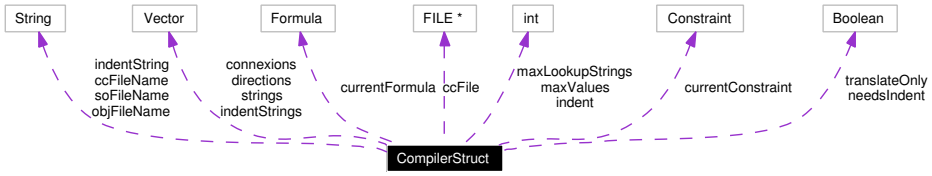
Referenced by interface_completion().

The documentation for this struct was generated from the following file:

- command.c

6.6 CompilerStruct Struct Reference

Collaboration diagram for CompilerStruct:



6.6.1 Detailed Description

definition of a CDG compiler object.

Definition at line 58 of file compile.c.

Data Fields

- FILE * ccFile
- String ccFileName
- Vector connexions
- Constraint currentConstraint
- Formula currentFormula
- Vector directions
- int indent
- String indentString
- Vector indentStrings
- int maxLookupStrings
- int maxValues
- Boolean needsIndent
- String objFileName
- String soFileName
- Vector strings
- Boolean translateOnly

6.6.2 Field Documentation

6.6.2.1 FILE* CompilerStruct::ccFile

filehandle of the file in ccFileName Definition at line 60 of file compile.c.

Referenced by comCompile(), comPrint(), comPrintln(), comWriteError(), and comWriteWarning().

6.6.2.2 String CompilerStruct::ccFileName

filename for C code Definition at line 59 of file compile.c.

Referenced by comCompile(), comMake(), comNew(), and comTranslate().

6.6.2.3 Vector CompilerStruct::connexions

collection of all defined connexions Definition at line 68 of file compile.c.

Referenced by comFree(), and comNew().

6.6.2.4 Constraint CompilerStruct::currentConstraint

the constraint being currently translated Definition at line 69 of file compile.c.

Referenced by comIndexOfVarInfo(), comNew(), comTranslateConnected(), comTranslateConstraint(), comTranslateEquation(), comTranslateIs(), comTranslateLookup(), comTranslateMatch(), comTranslateParent(), comTranslateSubsumes(), comTranslateUnEquation(), comWriteError(), and comWriteWarning().

6.6.2.5 Formula CompilerStruct::currentFormula

the Formula being currently translated Definition at line 70 of file compile.c.

Referenced by comTranslateFormula(), and comTranslateHas().

6.6.2.6 Vector CompilerStruct::directions

collection of all defined directions Definition at line 67 of file compile.c.

Referenced by comFree(), and comNew().

6.6.2.7 int CompilerStruct::indent

current indentation level Definition at line 63 of file compile.c.

Referenced by comIndent(), comNew(), comOutdent(), comTranslateBinaryConstraints(), comTranslateUnaryConstraints(), and comWriteFunctions().

6.6.2.8 String CompilerStruct::indentString

current indentation Definition at line 64 of file compile.c.

Referenced by comIndent(), comNew(), comOutdent(), comPrint(), and comPrintln().

6.6.2.9 Vector CompilerStruct::indentStrings

possible indentation Definition at line 65 of file compile.c.

Referenced by comFree(), comIndent(), comNew(), and comOutdent().

6.6.2.10 int CompilerStruct::maxLookupStrings

max number of Strings used in 'lookup' constraints Definition at line 72 of file compile.c.

Referenced by comAnalyzeGrammar(), and comWriteInitFunction().

6.6.2.11 int CompilerStruct::maxValues

max number of variables to eval all constraints Definition at line 71 of file compile.c.

Referenced by comAnalyzeGrammar(), and comWriteDeclarations().

6.6.2.12 Boolean CompilerStruct::needsIndent

TRUE by comPrintln, FALSE by comPrint Definition at line 66 of file compile.c.

Referenced by comNew(), comPrint(), comPrintln(), comWriteError(), and comWriteWarning().

6.6.2.13 String CompilerStruct::objFileName

filename for object code Definition at line 61 of file compile.c.

Referenced by comCompile(), comMake(), and comNew().

6.6.2.14 String CompilerStruct::soFileName

filename for C dll grammar Definition at line 62 of file compile.c.

Referenced by comCompile(), comLoad(), comMake(), and comNew().

6.6.2.15 Vector CompilerStruct::strings

list of strings to allocated statically Definition at line 73 of file compile.c.

Referenced by comFree(), comNew(), comRegisterString(), comWriteFinitFunction(), and comWriteInitFunction().

6.6.2.16 Boolean CompilerStruct::translateOnly

if TRUE we dont compile+load a shared object Definition at line 74 of file compile.c.

Referenced by comCompile(), and comNew().

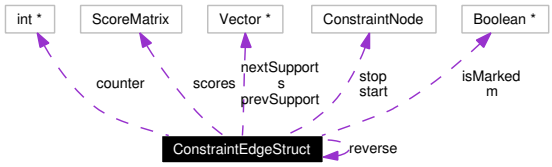
The documentation for this struct was generated from the following file:

- compile.c

6.7 ConstraintEdgeStruct Struct Reference

`#include <constraintnet.h>`

Collaboration diagram for ConstraintEdgeStruct:



6.7.1 Detailed Description

Models an edge between the two constraint nodes **start** and **stop**. These two fields are shallow copies of the nodes in the corresponding constraint net.

Definition at line 107 of file constraintnet.h.

Data Fields

- int * counter
- Boolean * isMarked
- Boolean * m
- Vector * nextSupport
- Vector * prevSupport
- ConstraintEdgeStruct * reverse
- Vector * s
- ScoreMatrix scores
- ConstraintNode start
- ConstraintNode stop

6.7.2 Field Documentation

6.7.2.1 int* ConstraintEdgeStruct::counter

counts support Definition at line 118 of file constraintnet.h.

6.7.2.2 Boolean* ConstraintEdgeStruct::isMarked

flag for marking, obsolete? Definition at line 119 of file constraintnet.h.

Referenced by cnBuildEdges(), and cnDeleteEdge().

6.7.2.3 Boolean* ConstraintEdgeStruct::m

flag whether <x,a> is already processed Definition at line 114 of file constraintnet.h.

6.7.2.4 Vector* ConstraintEdgeStruct::nextSupport

used by module arcconsistency Definition at line 116 of file constraintnet.h.

6.7.2.5 Vector* ConstraintEdgeStruct::prevSupport

used by module arcconsistency Definition at line 115 of file constraintnet.h.

6.7.2.6 struct ConstraintEdgeStruct* ConstraintEdgeStruct::reverse

points to the inverse of the edge itself. Definition at line 110 of file constraintnet.h.

Referenced by cnBuildEdges().

6.7.2.7 Vector* ConstraintEdgeStruct::s

used by module arcconsistency Definition at line 117 of file constraintnet.h.

6.7.2.8 ScoreMatrix ConstraintEdgeStruct::scores

holds all binary scores calculated for pairs of LVs from the two nodes Definition at line 112 of file constraintnet.h.

Referenced by cnBuildEdges(), cnDeleteEdge(), and cnPrintEdge().

6.7.2.9 ConstraintNode ConstraintEdgeStruct::start

start node Definition at line 108 of file constraintnet.h.

Referenced by cmdEdges(), cnBuildEdges(), and cnPrintEdge().

6.7.2.10 ConstraintNode ConstraintEdgeStruct::stop

end node Definition at line 109 of file constraintnet.h.

Referenced by cmdEdges(), cnBuildEdges(), and cnPrintEdge().

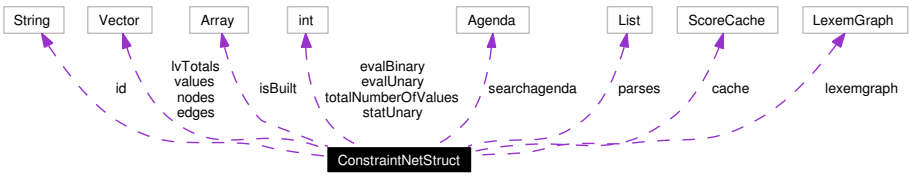
The documentation for this struct was generated from the following file:

- constraintnet.h

6.8 ConstraintNetStruct Struct Reference

`#include <constraintnet.h>`

Collaboration diagram for ConstraintNetStruct:



6.8.1 Detailed Description

The constraint net.

Definition at line 44 of file constraintnet.h.

Data Fields

- ScoreCache cache
- Vector edges
- int evalBinary
- int evalUnary
- String id
- Array isBuilt
- LexemGraph lexemgraph
- Vector lvTotals
- Vector nodes
- List parses
- Agenda searchagenda
- int statUnary
- int totalNumberOfValues
- Vector values

6.8.2 Field Documentation

6.8.2.1 ScoreCache ConstraintNetStruct::cache

Holds the cache used to hold the results of binary constraint evaluations. (This cache only exists if scUseCache was set when creating the net.) Definition at line 62 of file constraintnet.h.

Referenced by cnBuildFinal(), cnBuildInit(), cnDelete(), cnPrintInfo(), cnRenew(), comCompareAllLvPairs(), comCompareWithContext(), and evalBinary().

6.8.2.2 Vector ConstraintNetStruct::edges

Vector of ConstraintEdge Definition at line 53 of file constraintnet.h.

Referenced by cmdEdges(), cnBuildEdges(), cnBuildFinal(), cnBuildInit(), cnDelete(), cnPrint(), and cnPrintInfo().

6.8.2.3 int ConstraintNetStruct::evalBinary

Counting binary evaluations Definition at line 68 of file constraintnet.h.

Referenced by cnBuildInit(), cnPrintInfo(), evalBinaryConstraint(), and evalConstraint().

6.8.2.4 int ConstraintNetStruct::evalUnary

Counting unary evaluations Definition at line 66 of file constraintnet.h.

Referenced by cnBuildInit(), cnPrintInfo(), evalConstraint(), and evalUnaryConstraint().

6.8.2.5 String ConstraintNetStruct::id

A unique identifier for the net. Each net created by the system is labeled as net *n*, where *n* is the current value of cnCounter. Definition at line 45 of file constraintnet.h.

Referenced by cmdEdges(), cmdNetsearch(), cmdNewnet(), cmdWriteAnno(), cnBuildInit(), cnDelete(), cnPrint(), cnPrintInfo(), and comApprove().

6.8.2.6 Array ConstraintNetStruct::isBuilt

have LVs for wordx–>wordy been built? Definition at line 54 of file constraintnet.h.

Referenced by cnBuildFinal(), cnBuildInit(), cnBuildNodes(), and cnBuildTriple().

6.8.2.7 LexemGraph ConstraintNetStruct::lexemgraph

Points to the enriched word graph used in constructing the net. Definition at line 49 of file constraintnet.h.

Referenced by cmdDistance(), cnBuildEdges(), cnBuildFinal(), cnBuildIter(), cnBuildLevelValues(), cnBuildNodes(), cnBuildTriple(), cnDelete(), cnGetGraphemNodeFromArc(), cnGetLattice(), cnOptimizeNode(), cnPrint(), cnPrintActiveLVs(), cnPrintInfo(), cnRenew(), and cnTag().

6.8.2.8 Vector ConstraintNetStruct::lvTotals

Records how many LVs the net contained at each successive step in its history. This is only used by incrementalcompletion. Definition at line 69 of file constraintnet.h.

Referenced by cnBuildInit(), and cnDelete().

6.8.2.9 Vector ConstraintNetStruct::nodes

Vector of ConstraintNode Definition at line 52 of file constraintnet.h.

Referenced by cmdEdges(), cnBuildEdges(), cnBuildFinal(), cnBuildInit(), cnBuildIter(), cnBuildNodes(), cnBuildTriple(), cnBuildUpdateArcs(), cnDelete(), cnFindNode(), cnOptimizeNet(), cnPrint(), cnPrintActiveLVs(), cnPrintInfo(), cnRenew(), cnSortLVs(), cnSortNodes(), and comCompareNets().

6.8.2.10 List ConstraintNetStruct::parses

Contains all structures of type Parse found by any solution method. Definition at line 60 of file constraintnet.h.

Referenced by cmdNetsearch(), cmdPrintParses(), cmdWriteAnno(), cmdWriteParses(), cnBuildInit(), cnDelete(), cnPrint(), cnPrintParses(), and cnRenew().

6.8.2.11 Agenda ConstraintNetStruct::searchagenda

Agenda for searching, it is used by netsearch() Definition at line 55 of file constraintnet.h.

Referenced by cnBuildInit(), and cnDelete().

6.8.2.12 int ConstraintNetStruct::statUnary

Counting unary statistics Definition at line 67 of file constraintnet.h.

Referenced by cnBuildInit(), and cnPrintInfo().

6.8.2.13 int ConstraintNetStruct::totalNumberOfValues

Holds the total number of LVs in the constraint net. It should always be equal to vectorSize(net->values). Definition at line 57 of file constraintnet.h.

Referenced by cnBuildInit(), and cnBuildLv().

6.8.2.14 Vector ConstraintNetStruct::values

Vector of LevelValues Definition at line 51 of file constraintnet.h.

Referenced by cnBuildFinal(), cnBuildInit(), cnBuildLv(), cnBuildNodes(), cnDelete(), cnDeleteAllLVs(), cnPrintActiveLVs(), cnRenew(), cnUndeleteAllLVs(), comCompareAllLvPairs(), comCompareAllLvs(), comCompareNets(), comCompareWithContext(), comFindComparableLv(), and countValidValues().

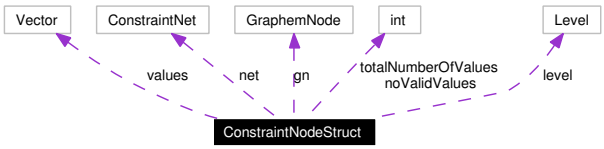
The documentation for this struct was generated from the following file:

- constraintnet.h

6.9 ConstraintNodeStruct Struct Reference

`#include <constraintnet.h>`

Collaboration diagram for ConstraintNodeStruct:



6.9.1 Detailed Description

Models a node in a constraint net

Definition at line 84 of file constraintnet.h.

Data Fields

- GraphemNode gn
- Level level
- ConstraintNet net
- int noValidValues
- int totalNumberOfValues
- Vector values

6.9.2 Field Documentation

6.9.2.1 GraphemNode ConstraintNodeStruct::gn

corresponding grapheme node Definition at line 88 of file constraintnet.h.

Referenced by cnBuildIter(), cnBuildTriple(), cnBuildUpdateArcs(), cnConnectedByArc(), cnIsEndNode(), cnIsStartNode(), cnOptimizeNode(), cnPrint(), cnPrintEdge(), and cnPrintNode().

6.9.2.2 Level ConstraintNodeStruct::level

points to the level for which a constraint node was built. Definition at line 86 of file constraintnet.h.

Referenced by cnBuildEdges(), cnBuildIter(), cnBuildTriple(), cnBuildUpdateArcs(), cnConnectedByArc(), cnIsEndNode(), cnIsStartNode(), cnNodeComparePrio(), cnOptimizeNode(), cnPrint(), cnPrintEdge(), and cnPrintNode().

6.9.2.3 ConstraintNet ConstraintNodeStruct::net

corresponding constraint net Definition at line 85 of file constraintnet.h.

Referenced by cnBuildIter(), cnBuildLevelValues(), and cnBuildLv().

6.9.2.4 int ConstraintNodeStruct::noValidValues

number of not yet deleted LVs Definition at line 93 of file constraintnet.h.

Referenced by cnBuildIter(), cnBuildTriple(), cnBuildUpdateArcs(), cnNodeCompareSmallest(), cnOptimizeNode(), cnPrint(), cnPrintInfo(), cnRenew(), cnSortNodes(), and cnUnaryPruning().

6.9.2.5 int ConstraintNodeStruct::totalNumberOfValues

number of level values Definition at line 92 of file constraintnet.h.

Referenced by cnBuildIter(), cnBuildLv(), cnBuildTriple(), and cnBuildUpdateArcs().

6.9.2.6 Vector ConstraintNodeStruct::values

holds shallow copies of all LVs that may be used to bind this constraint node. Definition at line 89 of file constraintnet.h.

Referenced by cnBuildEdges(), cnBuildIter(), cnBuildLv(), cnBuildTriple(), cnBuildUpdateArcs(), cnDeleteNode(), cnFindNode(), cnOptimizeNode(), cnPrint(), cnPrintActiveLVs(), cnPrintEdge(), cnRenew(), cnSortLVs(), cnUnaryPruning(), and comCompareNets().

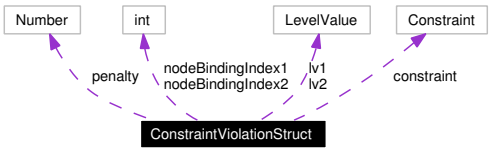
The documentation for this struct was generated from the following file:

- constraintnet.h

6.10 ConstraintViolationStruct Struct Reference

`#include <constraintnet.h>`

Collaboration diagram for ConstraintViolationStruct:



6.10.1 Detailed Description

Holds information about a constraint violated by a solution.

Definition at line 145 of file constraintnet.h.

Data Fields

- Constraint constraint
- LevelValue lv1
- LevelValue lv2
- int nodeBindingIndex1
- int nodeBindingIndex2
- Number penalty

6.10.2 Field Documentation

6.10.2.1 Constraint ConstraintViolationStruct::constraint

violated constraint Definition at line 146 of file constraintnet.h.

Referenced by cnCompareViolation(), comCompareAllLvPairs(), comCompareWithContext(), cvAnalyse(), cvClone(), cvCompare(), cvCompareNatural(), cvContains(), cvNew(), and cvPrint().

6.10.2.2 LevelValue ConstraintViolationStruct::lv1

first node binding Definition at line 155 of file constraintnet.h.

Referenced by comCompareAllLvPairs(), comCompareWithContext(), cvAnalyse(), cvClone(), cvCompare(), cvDelete(), and cvNew().

6.10.2.3 LevelValue ConstraintViolationStruct::lv2

second node binding, maybe empty Definition at line 159 of file constraintnet.h.

Referenced by comCompareAllLvPairs(), comCompareWithContext(), cvAnalyse(), cvClone(), cvCompare(), cvDelete(), and cvNew().

6.10.2.4 int ConstraintViolationStruct::nodeBindingIndex1

holds the position of the LV causing the conflict, as calculated by lvIndex(). Definition at line 152 of file constraintnet.h.

Referenced by cnCompareViolation(), cvCompareNatural(), cvContains(), cvNew(), and cvPrint().

6.10.2.5 int ConstraintViolationStruct::nodeBindingIndex2

holds the position of the LV causing the conflict, as calculated by lvIndex(). Definition at line 156 of file constraintnet.h.

Referenced by cnCompareViolation(), cvCompareNatural(), cvContains(), cvNew(), and cvPrint().

6.10.2.6 Number ConstraintViolationStruct::penalty

holds the penalty of this particular instance of **constraint** (recall that a constraint declaration specifies an entire set of constraints, possibly with variable penalties). Definition at line 147 of file constraintnet.h.

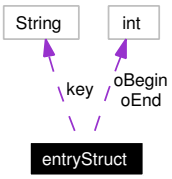
Referenced by cnCompareViolation(), comCompareAllLvPairs(), comCompareWithContext(), cvClone(), cvCompare(), cvNew(), and cvPrint().

The documentation for this struct was generated from the following file:

- constraintnet.h

6.11 entryStruct Struct Reference

Collaboration diagram for entryStruct:



6.11.1 Detailed Description

a database entry. This is an entry for the database which holds a key and the byte position of its lexical entry in the underlying cdg file.

Definition at line 78 of file cdgdb.c.

Data Fields

- String key
- int oBegin
- int oEnd

6.11.2 Field Documentation

6.11.2.1 String entryStruct::key

the key of the lexical entry. Definition at line 79 of file cdgdb.c.

Referenced by dbGetEntries(), and newDbEntry().

6.11.2.2 int entryStruct::oBegin

offset of its Beginning in the file Definition at line 80 of file cdgdb.c.

Referenced by dbGetEntries(), dbLoadEntries(), and newDbEntry().

6.11.2.3 int entryStruct::oEnd

offset of its End in the file Definition at line 81 of file cdgdb.c.

Referenced by dbGetEntries(), dbLoadEntries(), and newDbEntry().

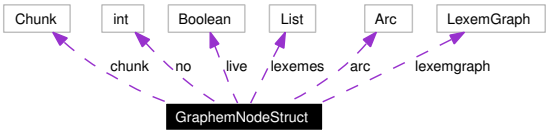
The documentation for this struct was generated from the following file:

- cdgdb.c

6.12 GraphemNodeStruct Struct Reference

`#include <lexemgraph.h>`

Collaboration diagram for GraphemNodeStruct:



6.12.1 Detailed Description

A grapheme node represents the hypothesis of a specific phonetic form for a specific time interval. Thus, it corresponds biuniquely to an Arc in the underlying Lattice. However, it also holds information about the state of processing by a particular grammar.

The field *no* is an index into the field *graphemnodes* of the enclosing lexeme graph.

The field *lexemgraph* points to this graph.

The field *arcpoints* to the corresponding Arc.

The field *lexicalEntries* contains a List of all known lexical entries with the same phonetic form as the word on the Arc.

The field *lexemes* contains all lexeme nodes built from the elements of *lexicalEntries*.

The field *ambiguity* counts how many of these lexeme nodes are currently undeleted.

Definition at line 113 of file lexemgraph.h.

Data Fields

- Arc arc
- Chunk chunk
- List lexemes
- LexemGraph lexemgraph
- Boolean live
- int no

6.12.2 Field Documentation

6.12.2.1 Arc GraphemNodeStruct::arc

arc in word lattice Definition at line 116 of file lexemgraph.h.

Referenced by cmpChunks(), cmpGraphemes(), cnBuildLevelValues(), cnBuildTriple(), cnGetGraphemNodeFromArc(), cnOptimizeNode(), cnPrintEdge(), cnPrintNode(), compareChunks(), computeNoOfPathsFromStart(), computeNoOfPathsToEnd(), embedChunk(), evalChunker(), evalTerm(), findChunk(), findGrapheme(), getChunks(), getFakeChunksAt(), gnClone(), lgComputeDistances(), lgComputeNoOfPaths(), lgContains(), lgIsEndNode(), lgIsStartNode(), lgNewIter(), mergeChunk(), postProcessChunks(), and printChunk().

6.12.2.2 Chunk GraphemNodeStruct::chunk

to which chunk do we belong Definition at line 119 of file lexemgraph.h.

Referenced by chunkerChunk(), evalTerm(), gnClone(), lgCopyTagScores(), and lgNewIter().

6.12.2.3 List GraphemNodeStruct::lexemes

list of disambiguated lexeme nodes Definition at line 117 of file lexemgraph.h.

Referenced by cnBuildIter(), cnBuildNodes(), cnBuildUpdateArcs(), cnOptimizeNode(), cnPrint(), cnPrintNode(), getCategories(), gnClone(), lgAreDeletableNodes(), lgComputeDistances(), lgComputeNoOfPaths(), lgDelete(), lgMayModify(), lgMostProbablePath(), lgNewIter(), lgPartitions(), and lgQueryCat().

6.12.2.4 LexemGraph GraphemNodeStruct::lexemgraph

pointer back to the lexem graph Definition at line 115 of file lexemgraph.h.

Referenced by getCategories(), gnClone(), lgIsEndNode(), lgIsStartNode(), and lgNewIter().

6.12.2.5 Boolean GraphemNodeStruct::live

are there any lexemes left undeleted? Definition at line 118 of file lexemgraph.h.

Referenced by computeNoOfPathsFromStart(), computeNoOfPathsToEnd(), and lgComputeNoOfPaths().

6.12.2.6 int GraphemNodeStruct::no

index in lg->graphemnodes Definition at line 114 of file lexemgraph.h.

Referenced by cnOptimizeNode(), computeNoOfPathsFromStart(), computeNoOfPathsToEnd(), gnClone(), lgAreDeletableNodes(), lgClone(), lgComputeNoOfPaths(), lgDistanceOfNodes(), and lgNewIter().

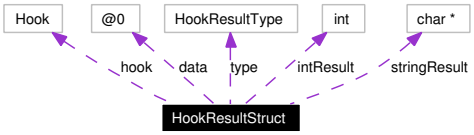
The documentation for this struct was generated from the following file:

- lexemgraph.h

6.13 HookResultStruct Struct Reference

`#include <hooker.h>`

Collaboration diagram for HookResultStruct:



6.13.1 Detailed Description

typed result of a hook. This structure tracks the result of a hook execution. The return value stored within is used in our special typemaps for the swig interface generator.

Definition at line 65 of file hooker.h.

Data Fields

- union {
  int intResult
  char * stringResult
  } data

- Hook hook
- HookResultType type

6.13.2 Field Documentation

6.13.2.1 union { ... } HookResultStruct::data

result data of different type

Referenced by getHookCmd(), initHookResult(), logWrite(), and logWriteChar().

6.13.2.2 Hook HookResultStruct::hook

the hook that produced this result Definition at line 71 of file hooker.h.

Referenced by getHookCmd(), initHookResult(), and logPrintf().

6.13.2.3 int HookResultStruct::intResult

integer result value Definition at line 68 of file hooker.h.

6.13.2.4 char* HookResultStruct::stringResult

string result value Definition at line 69 of file hooker.h.

6.13.2.5 HookResultType HookResultStruct::type

type of the result data Definition at line 66 of file hooker.h.

Referenced by evalHookHandle(), getHookCmd(), getsHookHandle(), glsInteractionHookHandle(), ICinteractionHookHandle(), initHookResult(), logFlush(), logWrite(), logWriteChar(), netsearchHook-Handle(), partialResultHookHandle(), progressHookHandle(), resetHookHandle(), and tclHookHandle().

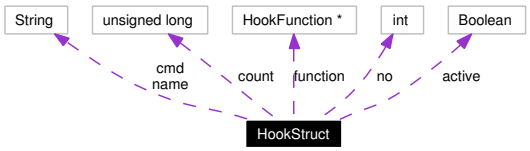
The documentation for this struct was generated from the following file:

- hooker.h

6.14 HookStruct Struct Reference

`#include <hook.h>`

Collaboration diagram for HookStruct:



6.14.1 Detailed Description

callback information. This structure bundles the state of a callback.

Definition at line 207 of file hook.h.

Data Fields

- Boolean active
- String cmd
- unsigned long count
- HookFunction * function
- String name
- int no

6.14.2 Field Documentation

6.14.2.1 Boolean HookStruct::active

flag indicating the status of the hook Definition at line 212 of file hook.h.

Referenced by cdgExecHook(), cmdHook(), and hkInitialize().

6.14.2.2 String HookStruct::cmd

command to be executed in tcl Definition at line 211 of file hook.h.

Referenced by evalHookHandle(), getHookCmd(), getsHookHandle(), glsInteractionHookHandle(), hkInitialize(), hooker_init(), ICinteractionHookHandle(), logFlush(), netsearchHookHandle(), partialResultHookHandle(), progressHookHandle(), resetHookHandle(), setHookCmd(), and tclHookHandle().

6.14.2.3 unsigned long HookStruct::count

number of past invocations Definition at line 209 of file hook.h.

Referenced by cdgExecHook(), cdgFlush(), cdgGetString(), cdgPrintf(), cmdHook(), and hkInitialize().

6.14.2.4 HookFunction* HookStruct::function

function which is called with a va_list argument Definition at line 213 of file hook.h.

Referenced by cdgExecHook(), cdgFlush(), cdgGetString(), cdgPrintf(), hkInitialize(), and hooker_init().

6.14.2.5 String HookStruct::name

identifier required to be unique among all hooks Definition at line 210 of file hook.h.

Referenced by cdgExecHook(), cmdHook(), hkFindNoOfHook(), and hkInitialize().

6.14.2.6 int HookStruct::no

index in vector hkHooks Definition at line 208 of file hook.h.

Referenced by hkInitialize().

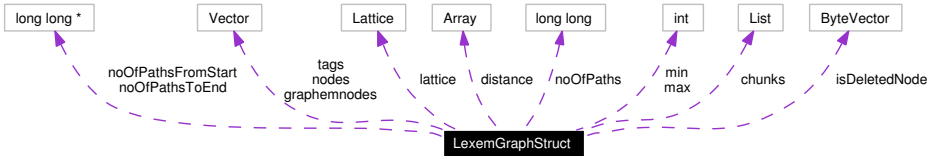
The documentation for this struct was generated from the following file:

- hook.h

6.15 LexemGraphStruct Struct Reference

`#include <lexemgraph.h>`

Collaboration diagram for LexemGraphStruct:



6.15.1 Detailed Description

A LexemGraph is a word graph enriched with lexical information. In particular, it contains several lexemes for each arc of the Lattice that is lexically ambiguous. Each of these pairs of lexical entry and time span is called a lexeme node. The field *lattice* points to the underlying word graph.

The Vectors *graphemnodes* and *nodes* contains all grapheme nodes and lexeme nodes. Grapheme nodes are an intermediary data structure between word arcs and lexeme nodes that is not strictly necessary.

The fields *min* and *max* correspond to the fields with the same names in the Lattice.

The field *distance* holds an Array of the distance between any two lexeme nodes. The distance is measured in words, hence any two adjacent lexeme nodes have distance$\sim$1. The distance array is also used to check whether two lexeme nodes are compatible with each other, i.e. whether there is a path through the lexeme graph that includes them both.

The fields *noOfPathsFromStart* and *noOfPathsToEnd* hold arrays that map each grapheme node to the number of complete paths from the start or to the end of the entire graph that go through it. This is used to determine whether a lexeme node can be deleted or not.

The field *noOfPaths* holds the total number of paths from start to end possible in the word graph. This should reflect the state of the Vector *isDeletedNode*.

WARNING: The last three fields use GNU's `long long int` type as a cheap way to get 64-bit integers because the number of paths in realistic word graphs really does need that. However, the tool SWIG cannot deal with this type, and as a result XCDG cannot access the LexemGraph structure at all. Several functions in this library exist only to work around this restriction. Ultimately these fields should be converted to a proper Bigint type.

The Vector *isDeletedNode* marks those lexeme nodes that have been deleted and should be ignored. For instance, when an LV is added to a partial solution, all lexeme nodes that are not lgCompatibleNodes() to its lexeme nodes should be marked as deleted.

Definition at line 72 of file lexemgraph.h.

Data Fields

- List chunks
- Array distance
- Vector graphemnodes
- ByteVector isDeletedNode
- Lattice lattice
- int max

- int min
- Vector nodes
- long long noOfPaths
- long long * noOfPathsFromStart
- long long * noOfPathsToEnd
- Vector tags

6.15.2 Field Documentation

6.15.2.1 List LexemGraphStruct::chunks

set of all chunks of the lattice Definition at line 87 of file lexemgraph.h.

Referenced by chunkerChunk(), cnPrint(), lgClone(), lgCopyTagScores(), lgDelete(), lgNewInit(), and lgPrint().

6.15.2.2 Array LexemGraphStruct::distance

matrix of distances Definition at line 81 of file lexemgraph.h.

Referenced by lgClone(), lgComputeDistances(), lgDelete(), lgDistanceOfNodes(), lgNewInit(), and lgUpdateArcs().

6.15.2.3 Vector LexemGraphStruct::graphemnodes

vector of grapheme nodes Definition at line 74 of file lexemgraph.h.

Referenced by cmdDistance(), cnBuildIter(), cnBuildNodes(), cnBuildTriple(), cnGetGraphemNodeFromArc(), cnTag(), computeNoOfPathsFromStart(), computeNoOfPathsToEnd(), findGrapheme(), getChunks(), lgClone(), lgComputeDistances(), lgComputeNoOfPaths(), lgContains(), lgDelete(), lgMostProbablePath(), lgNewFinal(), lgNewInit(), and lgNewIter().

6.15.2.4 ByteVector LexemGraphStruct::isDeletedNode

vector of boolean flags Definition at line 85 of file lexemgraph.h.

Referenced by cnPrint(), cnPrintActiveLVs(), cnRenew(), getCategories(), lgAreDeletableNodes(), lgClone(), lgComputeNoOfPaths(), lgCopySelection(), lgDelete(), lgDeleteNode(), lgDeleteNodes(), lgIsDeletedNode(), lgNewFinal(), lgNewInit(), lgNewIter(), lgPrint(), and lgPrintNode().

6.15.2.5 Lattice LexemGraphStruct::lattice

underlying word graph Definition at line 73 of file lexemgraph.h.

Referenced by cnGetLattice(), cnPrintInfo(), initFakeChunker(), lgClone(), lgMostProbablePath(), lgNew(), lgNewFinal(), lgNewInit(), lgPrint(), lgSpuriousUppercase(), and lgUpdateArcs().

6.15.2.6 int LexemGraphStruct::max

maximum end position Definition at line 77 of file lexemgraph.h.

Referenced by cnBuildFinal(), cnBuildNodes(), cnBuildTriple(), cnTag(), computeNoOfPathsToEnd(), evalTerm(), lgClone(), lgIsEndNode(), lgMakePath(), lgNewFinal(), lgNewInit(), lgNewIter(), and lgWidth().

6.15.2.7 int LexemGraphStruct::min

minimum start position Definition at line 76 of file lexemgraph.h.

Referenced by cnBuildFinal(), cnTag(), computeNoOfPathsFromStart(), lgClone(), lgComputeNoOfPaths(), lgIsStartNode(), lgMakePath(), lgNewInit(), and lgNewIter().

6.15.2.8 Vector LexemGraphStruct::nodes

vector of lexeme nodes Definition at line 75 of file lexemgraph.h.

Referenced by cnBuildEdges(), cnBuildIter(), cnBuildNodes(), cnOptimizeNode(), cnRenew(), cnTag(), lgClone(), lgComputeNoOfPaths(), lgCopySelection(), lgCopyTagScores(), lgDelete(), lgMakePath(), lgNewInit(), lgNewIter(), lgPrint(), lgRequireLexeme(), lgRequireLexemes(), and lgWidth().

6.15.2.9 long long LexemGraphStruct::noOfPaths

total number of paths through graph Definition at line 84 of file lexemgraph.h.

Referenced by cnPrint(), cnTag(), lgAreDeletableNodes(), lgComputeNoOfPaths(), lgDeleteNode(), lgDeleteNodes(), and lgNewFinal().

6.15.2.10 long long* LexemGraphStruct::noOfPathsFromStart

vector of numbers of paths Definition at line 82 of file lexemgraph.h.

Referenced by cnOptimizeNode(), computeNoOfPathsFromStart(), lgAreDeletableNodes(), lgClone(), lgComputeNoOfPaths(), lgDelete(), and lgNewInit().

6.15.2.11 long long* LexemGraphStruct::noOfPathsToEnd

vector of numbers of paths Definition at line 83 of file lexemgraph.h.

Referenced by cnOptimizeNode(), computeNoOfPathsToEnd(), lgAreDeletableNodes(), lgClone(), lgComputeNoOfPaths(), lgDelete(), and lgNewInit().

6.15.2.12 Vector LexemGraphStruct::tags

set of POS tags Definition at line 86 of file lexemgraph.h.

Referenced by lgCopyTagScores(), lgDelete(), lgNewFinal(), and lgNewInit().

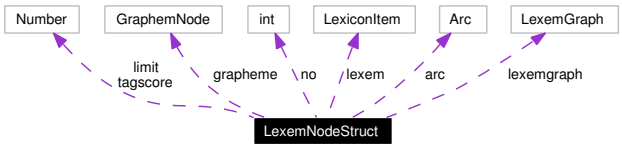
The documentation for this struct was generated from the following file:

- lexemgraph.h

6.16 LexemNodeStruct Struct Reference

`#include <lexemgraph.h>`

Collaboration diagram for LexemNodeStruct:



6.16.1 Detailed Description

A LexemNode represents the hypothesis of a specific lexical variant for a specific time interval.

The field *no* is the index of the lexeme node in the field *nodes* of the enclosing lexeme graph.

The field *lexemgraph* point to the enclosing lexeme graph.

The field *arc* points to the underlying Arc.

The field *lexem* points to the lexical entry postulated.

The field *grapheme* points to the grapheme node used to build the lexeme node.

The field *limit* corresponds to the field *limit* in an LV: a lexeme node with limit *x* can only appear in solutions not better than *x* (see Frobbing)

Definition at line 145 of file lexemgraph.h.

Data Fields

- Arc arc
- GraphemNode grapheme
- LexiconItem lexem
- LexemGraph lexemgraph
- Number limit
- int no
- Number tagscore

6.16.2 Field Documentation

6.16.2.1 Arc LexemNodeStruct::arc

arc in word lattice Definition at line 148 of file lexemgraph.h.

Referenced by evalTerm(), lgClone(), lgCompatibleSets(), lgCopySelection(), lgMakePath(), lgNewIter(), lgOverlap(), lgPrint(), lgPrintNode(), lgSimultaneous(), and lgWidth().

6.16.2.2 GraphemNode LexemNodeStruct::grapheme

pointer to the original grapheme Definition at line 150 of file lexemgraph.h.

Referenced by evalTerm(), lgClone(), lgDistanceOfNodes(), and lgNewIter().

6.16.2.3 LexiconItem LexemNodeStruct::lexem

lexical entry Definition at line 149 of file lexemgraph.h.

Referenced by cmdDistance(), cvAnalyse(), evalTerm(), getCategories(), lgClone(), lgCopySelection(), lgDelete(), lgDeleteNode(), lgDeleteNodes(), lgLexemeInLexemNodeList(), lgNewIter(), lgPartitions(), lgPrint(), lgPrintNode(), lgQueryCat(), lgSimultaneous(), and parseGetCategory().

6.16.2.4 LexemGraph LexemNodeStruct::lexemgraph

pointer back to the lexem graph Definition at line 147 of file lexemgraph.h.

Referenced by lgNewIter(), and lgPrintNode().

6.16.2.5 Number LexemNodeStruct::limit

limit calculated during frobbing Definition at line 153 of file lexemgraph.h.

Referenced by cnRenew(), lgClone(), and lgNewIter().

6.16.2.6 int LexemNodeStruct::no

index in LexemGraph::nodes Definition at line 146 of file lexemgraph.h.

Referenced by cnOptimizeNode(), getCategories(), lgAreDeletableNodes(), lgClone(), lgComputeNoOfPaths(), lgCopySelection(), lgDeleteNode(), lgDeleteNodes(), lgIsDeletedNode(), lgNewIter(), lgPrint(), lgPrintNode(), lgRequireLexeme(), and lgRequireLexemes().

6.16.2.7 Number LexemNodeStruct::tagscore

Tagger: probability of the associated category Definition at line 151 of file lexemgraph.h.

Referenced by getCategories(), lgCopyTagScores(), lgMostProbablePath(), lgNewIter(), and lgPrint().

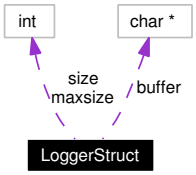
The documentation for this struct was generated from the following file:

- lexemgraph.h

6.17 LoggerStruct Struct Reference

`#include <hooker.h>`

Collaboration diagram for LoggerStruct:



6.17.1 Detailed Description

buffer of the output channel.

Definition at line 41 of file hooker.h.

Data Fields

- char * buffer
- int maxsize
- int size

6.17.2 Field Documentation

6.17.2.1 char* LoggerStruct::buffer

a chunk of memory to buffer stuff in Definition at line 44 of file hooker.h.

Referenced by hooker_init(), logFlush(), loggerSize(), and logWriteChar().

6.17.2.2 int LoggerStruct::maxsize

memory allocated in this buffer Definition at line 43 of file hooker.h.

Referenced by hooker_init(), loggerSize(), and logWriteChar().

6.17.2.3 int LoggerStruct::size

current size buffered Definition at line 42 of file hooker.h.

Referenced by hooker_init(), logFlush(), loggerSize(), and logWriteChar().

The documentation for this struct was generated from the following file:

- hooker.h

6.18 MakeInfoStruct Struct Reference

Collaboration diagram for MakeInfoStruct:

6.18.1 Detailed Description

default make settings. This structure bundles all the information that is needed to compile and link a binary `CDG` grammar. This is called `MakeInfo` in according to the normal place where such information is kept.

Definition at line 97 of file compile.c.

Data Fields

- String cc
- String cFlags
- String includes
- String ld
- String ldFlags
- String ldLibs

6.18.2 Field Documentation

6.18.2.1 String MakeInfoStruct::cc

CC Definition at line 98 of file compile.c.

Referenced by comCompile(), comInitialize(), comMake(), comMakeInfoFree(), and comMakeInfoNew().

6.18.2.2 String MakeInfoStruct::cFlags

CFLAGS Definition at line 100 of file compile.c.

Referenced by comCompile(), comInitialize(), comMake(), comMakeInfoFree(), and comMakeInfoNew().

6.18.2.3 String MakeInfoStruct::includes

INCLUDES Definition at line 103 of file compile.c.

Referenced by comCompile(), comInitialize(), comMake(), comMakeInfoFree(), and comMakeInfoNew().

6.18.2.4 String MakeInfoStruct::ld

LD Definition at line 99 of file compile.c.

Referenced by comCompile(), comInitialize(), comMake(), comMakeInfoFree(), and comMakeInfoNew().

6.18.2.5 String MakeInfoStruct::ldFlags

LDFLAGS Definition at line 101 of file compile.c.

Referenced by comCompile(), comInitialize(), comMake(), comMakeInfoFree(), and comMakeInfoNew().

6.18.2.6 String MakeInfoStruct::ldLibs

LDLIBS Definition at line 102 of file compile.c.

Referenced by comCompile(), comInitialize(), comMake(), comMakeInfoFree(), and comMakeInfoNew().

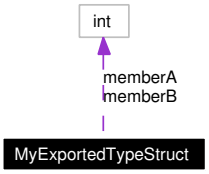
The documentation for this struct was generated from the following file:

- compile.c

6.19 MyExportedTypeStruct Struct Reference

`#include <skel.h>`

Collaboration diagram for MyExportedTypeStruct:



6.19.1 Detailed Description

short description. long description

Definition at line 36 of file skel.h.

Data Fields

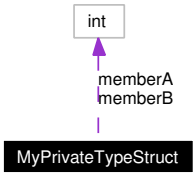
- int memberA
- int memberB

The documentation for this struct was generated from the following file:

- skel.h

6.20 MyPrivateTypeStruct Struct Reference

Collaboration diagram for MyPrivateTypeStruct:



6.20.1 Detailed Description

short description. long description

Definition at line 48 of file skel.c.

Data Fields

- int memberA
- int memberB

6.20.2 Field Documentation

6.20.2.1 int MyPrivateTypeStruct::memberA

description Definition at line 49 of file skel.c.

6.20.2.2 int MyPrivateTypeStruct::memberB

description Definition at line 50 of file skel.c.

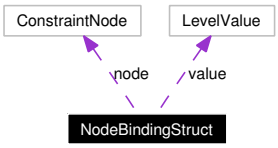
The documentation for this struct was generated from the following file:

- skel.c

6.21 NodeBindingStruct Struct Reference

`#include <constraintnet.h>`

Collaboration diagram for NodeBindingStruct:



6.21.1 Detailed Description

This serves merely merely to pair a constraint node and an LV.

Definition at line 130 of file constraintnet.h.

Data Fields

- ConstraintNode node
- LevelValue value

6.21.2 Field Documentation

6.21.2.1 ConstraintNode NodeBindingStruct::node

constraint node Definition at line 131 of file constraintnet.h.

6.21.2.2 LevelValue NodeBindingStruct::value

level value Definition at line 132 of file constraintnet.h.

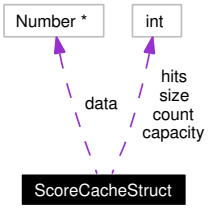
The documentation for this struct was generated from the following file:

- constraintnet.h

6.22 ScoreCacheStruct Struct Reference

`#include <scache.h>`

Collaboration diagram for ScoreCacheStruct:



6.22.1 Detailed Description

This structure administers a score for each pair of LVs in a constraint net.

Definition at line 34 of file scache.h.

Data Fields

- int capacity
- int count
- Number * data
- int hits
- int size

6.22.2 Field Documentation

6.22.2.1 int ScoreCacheStruct::capacity

currently available capacity Definition at line 40 of file scache.h.

Referenced by cnPrintInfo(), scNew(), and scSetScore().

6.22.2.2 int ScoreCacheStruct::count

holds the total number of LVs registered in the cache Definition at line 37 of file scache.h.

Referenced by scNew(), and scSetScore().

6.22.2.3 Number* ScoreCacheStruct::data

points to the underlying vector of Numbers Definition at line 41 of file scache.h.

Referenced by scDelete(), scGetScore(), scNew(), and scSetScore().

6.22.2.4 int ScoreCacheStruct::hits

holds the number of successful requests to the cache. Definition at line 35 of file scache.h.

Referenced by cnPrintInfo(), scGetScore(), and scNew().

6.22.2.5 int ScoreCacheStruct::size

maximum used capacity Definition at line 39 of file scache.h.

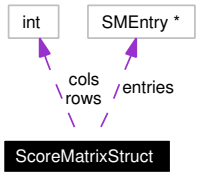
Referenced by cnPrintInfo(), scGetScore(), scNew(), and scSetScore().

The documentation for this struct was generated from the following file:

- scache.h

6.23 ScoreMatrixStruct Struct Reference

Collaboration diagram for ScoreMatrixStruct:



6.23.1 Detailed Description

The score matrix

Since not all matrices in the edges of a constraint net are of equal size, each matrix administrates the number of its rows and columns explicitly in addition to the array itself. The element *(r,c)* in a score matrix is always referenced by

sm->entries[c * sm->rows + r]

The last element of a matrix always has the index

sm->rows * sm->cols -1

The type **ScoreMatrix** is only used in a **ConstraintEdge**. A similar function is fulfilled by the structure **ScoreCache** defined by the module Scache - Cache structures for binary LV scores, which has the advantage of being usable even without constraint edges.

Definition at line 75 of file scorematrix.c.

Data Fields

- int cols
- SMEntry * entries
- int rows

6.23.2 Field Documentation

6.23.2.1 int ScoreMatrixStruct::cols

number of columns in the matrix Definition at line 77 of file scorematrix.c.

Referenced by smDelete(), smNew(), and smSetAllFlags().

6.23.2.2 SMEntry* ScoreMatrixStruct::entries

entries in the matrix Definition at line 78 of file scorematrix.c.

Referenced by smDelete(), smGetFlag(), smGetScore(), smNew(), smSetAllFlags(), smSetFlag(), and smSetScore().

6.23.2.3 int ScoreMatrixStruct::rows

number of rows in the matrix Definition at line 76 of file scorematrix.c.

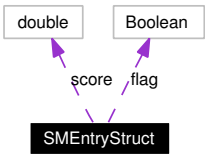
Referenced by smDelete(), smGetFlag(), smGetScore(), smNew(), smSetAllFlags(), smSetFlag(), and smSetScore().

The documentation for this struct was generated from the following file:

- scorematrix.c

6.24 SMEntryStruct Struct Reference

Collaboration diagram for SMEntryStruct:



6.24.1 Detailed Description

Entry in the matrix. All entries in the matrix are pairs of a score and a flag indicating whether this pair is valid or not.

Definition at line 46 of file scorematrix.c.

Data Fields

- Boolean flag
- double score

6.24.2 Field Documentation

6.24.2.1 Boolean SMEntryStruct::flag

indicating if this is a valid pari Definition at line 48 of file scorematrix.c.

Referenced by smGetFlag(), smNew(), smSetAllFlags(), and smSetFlag().

6.24.2.2 double SMEntryStruct::score

score of this entry Definition at line 47 of file scorematrix.c.

Referenced by smGetScore(), smNew(), and smSetScore().

The documentation for this struct was generated from the following file:

- scorematrix.c

Chapter 7

CDG Page Documentation

7.1 Todo List

Global interface_cell Write an explanation of the interface and the completion gadget

Global interface_hashiterator Write an explanation of the interface and the completion gadget

Global interface_index Write an explanation of the interface and the completion gadget

Global interface_length Write an explanation of the interface and the completion gadget

Global interface_list Write an explanation of the interface and the completion gadget

Global CDG_EVAL The `EVAL` channel is bogus and never used.

Global CDG_HINT The `HINT` channel is bogus and never used.

Global CDG_HOOK By no means this is an output channel. This define should be removed and replaced with a proper variable that is altered by the hook command.

Global CDG_PROLOG The `PROLOG` channel is bogus and never used.

Global lgIsEndNode(GraphemNode n) should nodes on segment boundaries of incremental parsed input be considered to be endnodes

Group HookBindings Please explain this module.

Global hkInterp This pointer isn't needed for newer swigs.

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