

epiworld

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1 Source code	1
2 Hierarchical Index	3
2.1 Class Hierarchy	3
3 Class Index	11
3.1 Class List	11
4 File Index	19
4.1 File List	19
5 Class Documentation	21
5.1 Catch::Clara::accept_many_t Struct Reference	21
5.2 Action< TSeq > Struct Template Reference	21
5.2.1 Detailed Description	22
5.2.2 Constructor & Destructor Documentation	22
5.2.2.1 Action()	22
5.3 AdjList Class Reference	23
5.3.1 Constructor & Destructor Documentation	23
5.3.1.1 AdjList()	23
5.3.2 Member Function Documentation	24
5.3.2.1 read_edgelist()	24
5.4 Agent< TSeq > Class Template Reference	24
5.4.1 Detailed Description	26
5.5 Agents< TSeq > Class Template Reference	26
5.6 Catch::Matchers::AllMatchMatcher< Matcher > Class Template Reference	27
5.7 Catch::always_false< T > Struct Template Reference	28
5.8 Catch::Matchers::AnyMatchMatcher< Matcher > Class Template Reference	29
5.9 Catch::Approx Class Reference	30
5.10 Catch::Matchers::ApproxMatcher< T, AllocComp, AllocMatch > Class Template Reference	31
5.11 Catch::Clara::Arg Class Reference	33
5.12 Catch::Clara::Args Class Reference	34
5.13 Catch::Generators::as< T > Struct Template Reference	35
5.14 Catch::AssertionHandler Class Reference	35
5.15 Catch::AssertionInfo Struct Reference	35
5.16 Catch::Detail::AssertionOrBenchmarkResult Class Reference	36
5.16.1 Detailed Description	36
5.17 Catch::AssertionReaction Struct Reference	36
5.18 Catch::AssertionResult Class Reference	37
5.19 Catch::AssertionResultData Struct Reference	38
5.20 Catch::AssertionStats Struct Reference	39
5.21 Catch::AutomakeReporter Class Reference	40
5.22 Catch::AutoReg Struct Reference	41
5.23 Catch::Clara::Detail::BasicResult< T > Class Template Reference	42

5.24 Catch::Benchmark::Benchmark Struct Reference	43
5.25 Catch::Benchmark::Detail::BenchmarkFunction Struct Reference	43
5.25.1 Detailed Description	44
5.26 Catch::BenchmarkInfo Struct Reference	44
5.27 Catch::BenchmarkStats< Duration > Struct Template Reference	45
5.28 Catch::BinaryExpr< LhsT, RhsT > Class Template Reference	46
5.29 Catch::Benchmark::Detail::bootstrap_analysis Struct Reference	47
5.30 Catch::Clara::Detail::BoundFlagLambda< L > Struct Template Reference	48
5.31 Catch::Clara::Detail::BoundFlagRef Struct Reference	50
5.32 Catch::Clara::Detail::BoundFlagRefBase Struct Reference	52
5.33 Catch::Clara::Detail::BoundLambda< L > Struct Template Reference	53
5.34 Catch::Clara::Detail::BoundManyLambda< L > Struct Template Reference	55
5.35 Catch::Clara::Detail::BoundRef Struct Reference	57
5.36 Catch::Clara::Detail::BoundValueRef< T > Struct Template Reference	58
5.37 Catch::Clara::Detail::BoundValueRef< std::vector< T > > Struct Template Reference	60
5.38 Catch::Clara::Detail::BoundValueRefBase Struct Reference	61
5.39 Catch::Capturer Class Reference	62
5.40 Catch::Matchers::CasedString Struct Reference	63
5.41 Catch::Detail::CaseInsensitiveEqualTo Struct Reference	63
5.41.1 Detailed Description	63
5.42 Catch::Detail::CaseInsensitiveLess Struct Reference	63
5.42.1 Detailed Description	64
5.43 Catch_global_namespace_dummy Struct Reference	64
5.44 Catch::Benchmark::Chronometer Struct Reference	64
5.45 Catch::Benchmark::Detail::ChronometerConcept Struct Reference	64
5.46 Catch::Benchmark::Detail::ChronometerModel< Clock > Struct Template Reference	65
5.47 Catch::Generators::ChunkGenerator< T > Class Template Reference	66
5.47.1 Member Function Documentation	67
5.47.1.1 next()	67
5.48 Catch::Colour Struct Reference	68
5.49 Catch::ColourImpl::ColourGuard Class Reference	68
5.49.1 Detailed Description	68
5.49.2 Member Function Documentation	69
5.49.2.1 engage() [1/2]	69
5.49.2.2 engage() [2/2]	69
5.50 Catch::ColourImpl Class Reference	69
5.50.1 Member Function Documentation	70
5.50.1.1 guardColour()	70
5.51 Catch::TextFlow::Column Class Reference	70
5.51.1 Detailed Description	71
5.52 Catch::TextFlow::Columns Class Reference	71
5.53 Catch::CompactReporter Class Reference	72

5.53.1 Member Function Documentation	73
5.53.1.1 testRunEnded()	73
5.53.1.2 testRunStarting()	73
5.54 Catch::Benchmark::Detail::CompleteInvoker< Result > Struct Template Reference	73
5.55 Catch::Benchmark::Detail::CompleteInvoker< void > Struct Reference	74
5.56 Catch::Benchmark::Detail::CompleteType< T > Struct Template Reference	74
5.57 Catch::Benchmark::Detail::CompleteType< void > Struct Reference	74
5.58 Catch::Clara::Detail::ComposableParserImpl< DerivedT > Class Template Reference	75
5.59 Catch::Config Class Reference	76
5.60 Catch::ConfigData Struct Reference	77
5.61 Catch::Matchers::Detail::conjunction< Cond > Struct Template Reference	78
5.62 Catch::Matchers::Detail::conjunction< Cond, Rest... > Struct Template Reference	79
5.63 Catch::ConsoleReporter Class Reference	80
5.63.1 Member Function Documentation	81
5.63.1.1 testRunEnded()	82
5.63.1.2 testRunStarting()	82
5.64 Catch::TextFlow::Column::const_iterator Class Reference	82
5.64.1 Detailed Description	83
5.65 Catch::Matchers::ContainsElementMatcher< T, Equality > Class Template Reference	83
5.65.1 Detailed Description	84
5.66 Catch::Matchers::ContainsMatcher< T, AllocComp, AllocMatch > Class Template Reference	85
5.67 Catch::Matchers::ContainsMatcherMatcher< Matcher > Class Template Reference	86
5.67.1 Detailed Description	87
5.68 Catch::Counts Struct Reference	87
5.69 Catch::CumulativeReporterBase Class Reference	88
5.69.1 Detailed Description	90
5.69.2 Member Function Documentation	90
5.69.2.1 testRunEnded()	90
5.69.2.2 testRunStarting()	90
5.70 DataBase< TSeq > Class Template Reference	91
5.70.1 Detailed Description	92
5.70.2 Member Function Documentation	92
5.70.2.1 record_variant()	92
5.70.2.2 reproductive_number()	93
5.70.2.3 transition_probability()	93
5.71 Catch::Decomposer Struct Reference	93
5.72 Catch::Matchers::EndsWithMatcher Class Reference	94
5.73 Entity< TSeq > Class Template Reference	95
5.74 Catch::Detail::EnumInfo Struct Reference	95
5.75 Catch::Detail::EnumValuesRegistry Class Reference	96
5.76 Catch::Benchmark::Environment< Clock > Struct Template Reference	97
5.77 Catch::Benchmark::EnvironmentEstimate< Duration > Struct Template Reference	98

5.78 Catch::Matchers::EqualsMatcher< T, AllocComp, AllocMatch > Class Template Reference	99
5.79 Catch::ErrnoGuard Class Reference	100
5.79.1 Detailed Description	100
5.80 Catch::Benchmark::Estimate< Duration > Struct Template Reference	100
5.81 Catch::EventListenerBase Class Reference	101
5.81.1 Detailed Description	102
5.81.2 Member Function Documentation	103
5.81.2.1 testRunEnded()	103
5.81.2.2 testRunStarting()	103
5.82 Catch::EventListenerFactory Class Reference	103
5.83 Catch::Matchers::ExceptionMessageMatcher Class Reference	104
5.84 Catch::ExceptionTranslatorRegistrar Class Reference	105
5.85 Catch::ExceptionTranslatorRegistry Class Reference	105
5.86 Catch::Benchmark::ExecutionPlan< Duration > Struct Template Reference	106
5.87 Catch::Clara::ExeName Class Reference	107
5.88 Catch::ExprLhs< LhsT > Class Template Reference	108
5.89 Catch::Clara::Detail::fake_arg Struct Reference	108
5.90 Catch::FatalConditionHandler Class Reference	109
5.90.1 Detailed Description	109
5.91 Catch::FatalConditionHandlerGuard Class Reference	109
5.91.1 Detailed Description	109
5.92 Catch::Generators::FilterGenerator< T, Predicate > Class Template Reference	110
5.92.1 Member Function Documentation	111
5.92.1.1 next()	111
5.93 Catch::TestSpec::FilterMatch Struct Reference	111
5.94 Catch::Generators::FixedValuesGenerator< T > Class Template Reference	112
5.94.1 Member Function Documentation	113
5.94.1.1 next()	113
5.95 Catch::GeneratorException Class Reference	113
5.96 Catch::Generators::Generators< T > Class Template Reference	114
5.96.1 Member Function Documentation	115
5.96.1.1 next()	115
5.97 Catch::Generators::GeneratorUntypedBase Class Reference	116
5.97.1 Member Function Documentation	116
5.97.1.1 countedNext()	117
5.97.1.2 currentElementAsString()	117
5.98 Catch::Generators::GeneratorWrapper< T > Class Template Reference	117
5.99 Catch::Detail::has_description< T, typename > Struct Template Reference	118
5.100 Catch::Detail::has_description< T, void_t< decltype(T::getDescription())> > Struct Template Reference	119
5.101 Catch::Matchers::HasSizeMatcher Class Reference	120
5.102 Catch::Clara::Help Struct Reference	121

5.103 Catch::Clara::Detail::HelpColumns Struct Reference	122
5.104 Catch::IConfig Class Reference	123
5.105 Catch::IContext Class Reference	124
5.106 Catch::IEventListener Class Reference	125
5.106.1 Detailed Description	127
5.106.2 Member Function Documentation	127
5.106.2.1 testRunEnded()	127
5.106.2.2 testRunStarting()	127
5.107 Catch::IExceptionTranslator Class Reference	128
5.108 Catch::IExceptionTranslatorRegistry Class Reference	128
5.109 Catch::Generators::IGenerator< T > Class Template Reference	129
5.110 Catch::IGeneratorTracker Class Reference	130
5.111 Catch::IMutableContext Class Reference	130
5.112 Catch::IMutableEnumValuesRegistry Class Reference	131
5.113 Catch::IMutableRegistryHub Class Reference	132
5.114 Catch::IRegistryHub Class Reference	132
5.115 Catch::IReporterFactory Class Reference	132
5.116 Catch::IReporterRegistry Class Reference	133
5.117 Catch::IResultCapture Class Reference	134
5.118 Catch::is_callable< T > Struct Template Reference	135
5.119 Catch::is_callable< Fun(Args...) > Struct Template Reference	135
5.120 Catch::is_callable_tester Struct Reference	136
5.121 Catch::is_range< T > Struct Template Reference	136
5.122 Catch::Detail::is_range_impl< T, typename > Struct Template Reference	137
5.123 Catch::Detail::is_range_impl< T, void_t< decltype(begin(std::declval< T >())) > > Struct Template Reference	138
5.124 Catch::Benchmark::Detail::is_related< T, U > Struct Template Reference	139
5.125 Catch::Clara::Detail::is_unary_function< F, typename > Struct Template Reference	140
5.126 Catch::Clara::Detail::is_unary_function< F, Catch::Detail::void_t< decltype(std::declval< F >())(fake_arg()) > > Struct Template Reference	141
5.127 Catch::Matchers::IsEmptyMatcher Class Reference	142
5.128 Catch::ISingleton Struct Reference	143
5.129 Catch::Detail::IsStreamInsertable< T > Class Template Reference	144
5.130 Catch::IStream Class Reference	144
5.130.1 Member Function Documentation	144
5.130.1.1 isConsole()	144
5.131 Catch::ITagAliasRegistry Class Reference	145
5.132 Catch::TextFlow::Columns::iterator Class Reference	145
5.133 Catch::Generators::IteratorGenerator< T > Class Template Reference	146
5.133.1 Member Function Documentation	147
5.133.1.1 next()	147
5.134 Catch::ITestCaseRegistry Class Reference	147
5.135 Catch::ITestInvoker Class Reference	148

5.136 Catch::TestCaseTracking::ITracker Class Reference	148
5.136.1 Member Function Documentation	150
5.136.1.1 findChild()	150
5.136.1.2 isGeneratorTracker()	150
5.136.1.3 isSectionTracker()	150
5.137 Catch::ITransientExpression Class Reference	150
5.138 Catch::JUnitReporter Class Reference	151
5.138.1 Member Function Documentation	152
5.138.1.1 testRunStarting()	152
5.139 Catch::Clara::Detail::LambdaInvoker< ReturnType > Struct Template Reference	152
5.140 Catch::Clara::Detail::LambdaInvoker< void > Struct Reference	153
5.141 Catch::LazyExpression Class Reference	153
5.142 Catch::LeakDetector Struct Reference	153
5.143 LFMCMC< TData > Class Template Reference	153
5.143.1 Detailed Description	154
5.144 Catch::lineOfChars Struct Reference	155
5.145 Catch::ListenerDescription Struct Reference	155
5.146 Catch::ListenerRegistrar< T > Class Template Reference	156
5.147 Catch::Detail::make_void<... > Struct Template Reference	156
5.148 Catch::Generators::MapGenerator< T, U, Func > Class Template Reference	156
5.148.1 Member Function Documentation	157
5.148.1.1 next()	157
5.149 Catch::Matchers::Detail::MatchAllOf< ArgT > Class Template Reference	158
5.150 Catch::Matchers::Detail::MatchAllOfGeneric< MatcherTs > Class Template Reference	159
5.151 Catch::Matchers::Detail::MatchAnyOf< ArgT > Class Template Reference	161
5.152 Catch::Matchers::Detail::MatchAnyOfGeneric< MatcherTs > Class Template Reference	162
5.153 Catch::Matchers::MatcherBase< T > Class Template Reference	164
5.154 Catch::Matchers::MatcherGenericBase Class Reference	165
5.155 Catch::Matchers::MatcherUntypedBase Class Reference	167
5.156 Catch::MatchExpr< ArgT, MatcherT > Class Template Reference	168
5.157 Catch::Matchers::Detail::MatchNotOf< ArgT > Class Template Reference	169
5.158 Catch::Matchers::Detail::MatchNotOfGeneric< MatcherT > Class Template Reference	171
5.159 Catch::MessageBuilder Struct Reference	172
5.160 Catch::MessageInfo Struct Reference	173
5.161 Catch::MessageStream Struct Reference	174
5.162 Model< TSeq > Class Template Reference	175
5.162.1 Detailed Description	181
5.162.2 Member Function Documentation	181
5.162.2.1 add_global_action()	181
5.162.2.2 reset()	182
5.162.2.3 run_multiple()	182
5.162.2.4 write_data()	182

5.163 Catch::MultiReporter Class Reference	183
5.163.1 Member Function Documentation	185
5.163.1.1 testRunEnded()	185
5.163.1.2 testRunStarting()	185
5.164 Catch::TestCaseTracking::NameAndLocation Struct Reference	186
5.165 Catch::NameAndTags Struct Reference	187
5.166 Catch::CumulativeReporterBase::Node< T, ChildNodeT > Struct Template Reference	187
5.167 Catch::Detail::NonCopyable Class Reference	188
5.167.1 Detailed Description	188
5.168 Catch::Matchers::NoneMatchMatcher< Matcher > Class Template Reference	189
5.169 Catch::Benchmark::now< Clock > Struct Template Reference	190
5.170 Catch::Benchmark::Detail::ObjectStorage< T, Destruct > Struct Template Reference	190
5.171 Catch::Clara::Opt Class Reference	191
5.172 Catch::Optional< T > Class Template Reference	193
5.173 Catch::Benchmark::OutlierClassification Struct Reference	193
5.174 Catch::Clara::Parser Class Reference	194
5.175 Catch::Clara::Detail::ParserBase Class Reference	195
5.176 Catch::Clara::Detail::ParserRefImpl< DerivedT > Class Template Reference	196
5.177 Catch::Clara::Detail::ParseState Class Reference	197
5.178 PersonTools< TSeq > Class Template Reference	197
5.179 Catch::pluralise Class Reference	198
5.179.1 Detailed Description	198
5.180 Catch::Matchers::PredicateMatcher< T, Predicate > Class Template Reference	198
5.181 Catch::ProcessedReporterSpec Struct Reference	199
5.181.1 Detailed Description	200
5.182 Progress Class Reference	200
5.182.1 Detailed Description	200
5.183 Queue< TSeq > Class Template Reference	200
5.183.1 Detailed Description	200
5.184 RandGraph Class Reference	201
5.185 Catch::Generators::RandomFloatingGenerator< Float > Class Template Reference	201
5.185.1 Member Function Documentation	202
5.185.1.1 next()	202
5.186 Catch::Generators::RandomIntegerGenerator< Integer > Class Template Reference	203
5.186.1 Member Function Documentation	204
5.186.1.1 next()	204
5.187 Catch::Generators::RangeGenerator< T > Class Template Reference	204
5.187.1 Member Function Documentation	205
5.187.1.1 next()	205
5.188 Catch::ratio_string< Ratio > Struct Template Reference	206
5.189 Catch::ratio_string< std::atto > Struct Reference	206
5.190 Catch::ratio_string< std::femto > Struct Reference	206

5.191 Catch::ratio_string< std::micro > Struct Reference	206
5.192 Catch::ratio_string< std::milli > Struct Reference	207
5.193 Catch::ratio_string< std::nano > Struct Reference	207
5.194 Catch::ratio_string< std::pico > Struct Reference	207
5.195 Catch::RedirectedStdErr Class Reference	207
5.196 Catch::RedirectedStdOut Class Reference	208
5.197 Catch::RedirectedStream Class Reference	208
5.198 Catch::RedirectedStreams Class Reference	208
5.199 Catch::Matchers::RegexMatcher Class Reference	209
5.200 Catch::RegistrarForTagAliases Struct Reference	210
5.201 Catch::Benchmark::Detail::repeater< Fun > Struct Template Reference	210
5.202 Catch::Generators::RepeatGenerator< T > Class Template Reference	211
5.202.1 Member Function Documentation	212
5.202.1.1 next()	212
5.203 Catch::ReporterBase Class Reference	212
5.203.1 Detailed Description	213
5.203.2 Member Function Documentation	213
5.203.2.1 listListeners()	213
5.203.2.2 listReporters()	214
5.203.2.3 listTags()	214
5.203.2.4 listTests()	214
5.203.3 Member Data Documentation	214
5.203.3.1 m_stream	215
5.204 Catch::ReporterConfig Struct Reference	215
5.205 Catch::ReporterDescription Struct Reference	215
5.206 Catch::ReporterFactory< T > Class Template Reference	216
5.207 Catch::ReporterPreferences Struct Reference	216
5.207.1 Detailed Description	217
5.207.2 Member Data Documentation	217
5.207.2.1 shouldRedirectStdOut	217
5.207.2.2 shouldReportAllAssertions	217
5.208 Catch::ReporterRegistrar< T > Class Template Reference	217
5.209 Catch::ReporterRegistry Class Reference	218
5.210 Catch::ReporterSpec Class Reference	219
5.210.1 Detailed Description	219
5.211 Catch::Clara::Detail::ResultBase Class Reference	219
5.212 Catch::ResultDisposition Struct Reference	220
5.213 Catch::Clara::Detail::ResultValueBase< T > Class Template Reference	220
5.214 Catch::Clara::Detail::ResultValueBase< void > Class Reference	222
5.215 Catch::ResultWas Struct Reference	223
5.216 Catch::ReusableStringStream Class Reference	223
5.217 Catch::RunContext Class Reference	224

5.218 Catch::Benchmark::SampleAnalysis< Duration > Struct Template Reference	226
5.219 Catch::XmlWriter::ScopedElement Class Reference	226
5.220 Catch::ScopedMessage Class Reference	227
5.221 Catch::Section Class Reference	228
5.222 Catch::SectionEndInfo Struct Reference	229
5.223 Catch::SectionInfo Struct Reference	229
5.224 Catch::CumulativeReporterBase::SectionNode Struct Reference	230
5.225 Catch::SectionStats Struct Reference	231
5.226 Catch::TestCaseTracking::SectionTracker Class Reference	232
5.226.1 Member Function Documentation	233
5.226.1.1 isSectionTracker()	233
5.227 Catch::Session Class Reference	233
5.228 Catch::SimplePcg32 Class Reference	234
5.229 Catch::Singleton< SingletonImplT, InterfaceT, MutableInterfaceT > Class Template Reference	235
5.230 Catch::Generators::SingleValueGenerator< T > Class Template Reference	236
5.230.1 Member Function Documentation	237
5.230.1.1 next()	237
5.231 Catch::Matchers::SizeMatchesMatcher< Matcher > Class Template Reference	238
5.232 Catch::SonarQubeReporter Class Reference	239
5.232.1 Member Function Documentation	240
5.232.1.1 testRunStarting()	240
5.233 Catch::SourceLineInfo Struct Reference	240
5.234 Catch::Matchers::StartsWithMatcher Class Reference	241
5.235 Catch::StartupExceptionRegistry Class Reference	242
5.236 Catch::StreamEndStop Struct Reference	242
5.237 Catch::StreamingReporterBase Class Reference	242
5.237.1 Member Function Documentation	243
5.237.1.1 testRunEnded()	244
5.237.1.2 testRunStarting()	244
5.238 Catch::Matchers::StringContainsMatcher Class Reference	245
5.239 Catch::Matchers::StringEqualsMatcher Class Reference	246
5.240 Catch::StringMaker< T, typename > Struct Template Reference	247
5.241 Catch::StringMaker< bool > Struct Reference	247
5.242 Catch::StringMaker< Catch::Approx > Struct Reference	247
5.243 Catch::StringMaker< char * > Struct Reference	247
5.244 Catch::StringMaker< char > Struct Reference	248
5.245 Catch::StringMaker< char const * > Struct Reference	248
5.246 Catch::StringMaker< char[SZ]> Struct Template Reference	248
5.247 Catch::StringMaker< double > Struct Reference	248
5.248 Catch::StringMaker< float > Struct Reference	249
5.249 Catch::StringMaker< int > Struct Reference	249
5.250 Catch::StringMaker< long > Struct Reference	249

5.251	Catch::StringMaker< long long > Struct Reference	249
5.252	Catch::StringMaker< R C::* > Struct Template Reference	250
5.253	Catch::StringMaker< R, std::enable_if_t< is_range< R >::value &&!::Catch::Detail::IsStream← Insertable< R >::value > > Struct Template Reference	250
5.254	Catch::StringMaker< signed char > Struct Reference	250
5.255	Catch::StringMaker< signed char[SZ]> Struct Template Reference	250
5.256	Catch::StringMaker< std::chrono::duration< Value, Ratio > > Struct Template Reference	251
5.257	Catch::StringMaker< std::chrono::duration< Value, std::ratio< 1 > > > Struct Template Reference	251
5.258	Catch::StringMaker< std::chrono::duration< Value, std::ratio< 3600 > > > Struct Template Ref- erence	251
5.259	Catch::StringMaker< std::chrono::duration< Value, std::ratio< 60 > > > Struct Template Reference	251
5.260	Catch::StringMaker< std::chrono::time_point< Clock, Duration > > Struct Template Reference	252
5.261	Catch::StringMaker< std::chrono::time_point< std::chrono::system_clock, Duration > > Struct Template Reference	252
5.262	Catch::StringMaker< std::nullptr_t > Struct Reference	252
5.263	Catch::StringMaker< std::string > Struct Reference	252
5.264	Catch::StringMaker< std::wstring > Struct Reference	253
5.265	Catch::StringMaker< T * > Struct Template Reference	253
5.266	Catch::StringMaker< T[SZ]> Struct Template Reference	253
5.267	Catch::StringMaker< unsigned char > Struct Reference	253
5.268	Catch::StringMaker< unsigned char[SZ]> Struct Template Reference	254
5.269	Catch::StringMaker< unsigned int > Struct Reference	254
5.270	Catch::StringMaker< unsigned long > Struct Reference	254
5.271	Catch::StringMaker< unsigned long long > Struct Reference	254
5.272	Catch::StringMaker< wchar_t * > Struct Reference	255
5.273	Catch::StringMaker< wchar_t const * > Struct Reference	255
5.274	Catch::Matchers::StringMatcherBase Class Reference	255
5.275	Catch::StringRef Class Reference	256
5.275.1	Detailed Description	257
5.275.2	Member Function Documentation	257
5.275.2.1	compare()	257
5.276	Catch::Tag Struct Reference	257
5.276.1	Detailed Description	258
5.277	Catch::TagAlias Struct Reference	258
5.278	Catch::TagAliasRegistry Class Reference	259
5.279	Catch::TagInfo Struct Reference	259
5.280	Catch::Generators::TakeGenerator< T > Class Template Reference	260
5.280.1	Member Function Documentation	261
5.280.1.1	next()	261
5.281	Catch::TAPReporter Class Reference	262
5.281.1	Member Function Documentation	263
5.281.1.1	testRunEnded()	263
5.281.1.2	testRunStarting()	263

5.282 Catch::TeamCityReporter Class Reference	264
5.282.1 Member Function Documentation	265
5.282.1.1 testRunEnded()	265
5.282.1.2 testRunStarting()	265
5.283 Catch::TestCaseHandle Class Reference	265
5.283.1 Detailed Description	266
5.284 Catch::TestCaseInfo Struct Reference	266
5.284.1 Detailed Description	267
5.285 Catch::TestCaseInfoHasher Class Reference	267
5.286 Catch::TestCaseStats Struct Reference	268
5.287 Catch::TestFailureException Struct Reference	268
5.287.1 Detailed Description	268
5.288 Catch::TestInvokerAsFunction Class Reference	269
5.289 Catch::TestInvokerAsMethod< C > Class Template Reference	270
5.290 Catch::TestRegistry Class Reference	271
5.291 Catch::TestRunInfo Struct Reference	272
5.292 Catch::TestRunStats Struct Reference	272
5.293 Catch::TestSpec Class Reference	273
5.294 Catch::TestSpecParser Class Reference	274
5.295 Catch::Timer Class Reference	274
5.296 Catch::Benchmark::Timing< Duration, Result > Struct Template Reference	274
5.297 Catch::Clara::Detail::Token Struct Reference	274
5.298 Catch::Clara::Detail::TokenStream Class Reference	275
5.299 Tool< TSeq > Class Template Reference	275
5.299.1 Detailed Description	276
5.300 Tools< TSeq > Class Template Reference	276
5.300.1 Detailed Description	277
5.301 Tools_const< TSeq > Class Template Reference	277
5.301.1 Detailed Description	278
5.302 Catch::Totals Struct Reference	278
5.303 Catch::TestCaseTracking::TrackerBase Class Reference	279
5.304 Catch::TestCaseTracking::TrackerContext Class Reference	280
5.305 Catch::true_given< typename > Struct Template Reference	281
5.306 Catch::Benchmark::Detail::CompleteType< void >::type Struct Reference	281
5.307 Catch::UnaryExpr< LhsT > Class Template Reference	282
5.308 Catch::Clara::Detail::UnaryLambdaTraits< L > Struct Template Reference	282
5.309 Catch::Clara::Detail::UnaryLambdaTraits< ReturnT(ClassT::*)(Args...) const > Struct Template Reference	283
5.310 Catch::Clara::Detail::UnaryLambdaTraits< ReturnT(ClassT::*)(ArgT) const > Struct Template Reference	283
5.311 Catch::Detail::unique_ptr< T > Class Template Reference	283
5.311.1 Detailed Description	284
5.312 Catch::Matchers::UnorderedEqualsMatcher< T, AllocComp, AllocMatch > Class Template Reference	284

5.313 UserData< TSeq > Class Template Reference	285
5.313.1 Detailed Description	286
5.313.2 Constructor & Destructor Documentation	287
5.313.2.1 UserData()	287
5.314 vecHasher< T > Struct Template Reference	287
5.314.1 Detailed Description	287
5.315 Catch::Matchers::VectorContainsElementMatcher< T, Alloc > Class Template Reference	288
5.316 Catch::Version Struct Reference	289
5.317 Virus< TSeq > Class Template Reference	290
5.317.1 Detailed Description	291
5.318 Viruses< TSeq > Class Template Reference	292
5.318.1 Detailed Description	292
5.319 Viruses_const< TSeq > Class Template Reference	292
5.319.1 Detailed Description	293
5.320 Catch::WaitForKeypress Struct Reference	293
5.321 Catch::WarnAbout Struct Reference	293
5.321.1 Member Enumeration Documentation	294
5.321.1.1 What	294
5.322 Catch::WildcardPattern Class Reference	294
5.323 Catch::Matchers::WithinAbsMatcher Class Reference	294
5.324 Catch::Matchers::WithinRelMatcher Class Reference	296
5.325 Catch::Matchers::WithinUlpMatcher Class Reference	297
5.326 Catch::XmlEncode Class Reference	298
5.326.1 Detailed Description	298
5.327 Catch::XmlReporter Class Reference	299
5.327.1 Member Function Documentation	300
5.327.1.1 listListeners()	300
5.327.1.2 listReporters()	300
5.327.1.3 listTags()	301
5.327.1.4 listTests()	301
5.327.1.5 testRunEnded()	301
5.327.1.6 testRunStarting()	301
5.328 Catch::XmlWriter Class Reference	302
5.328.1 Member Function Documentation	302
5.328.1.1 writeAttribute()	302
6 File Documentation	303
6.1 include/catch2/catch_amalgamated.hpp File Reference	303
6.1.1 Detailed Description	330
6.1.2 Macro Definition Documentation	331
6.1.2.1 CATCH_INTERNAL_DEFINE_EXPRESSION_OPERATOR	331
6.1.2.2 CATCH_REGISTER_LISTENER	331

6.1.2.3 CATCH_REGISTER_REPORTER	331
6.1.2.4 CATCH_REGISTER_TAG_ALIAS	332
6.1.2.5 GENERATE	332
6.1.2.6 GENERATE_COPY	332
6.1.2.7 GENERATE_REF	332
6.1.2.8 INTERNAL_CATCH_BENCHMARK	333
6.1.2.9 INTERNAL_CATCH_BENCHMARK_ADVANCED	333
6.1.2.10 INTERNAL_CATCH_CAPTURE	333
6.1.2.11 INTERNAL_CATCH_DECLARE_SIG_TEST1	333
6.1.2.12 INTERNAL_CATCH_DECLARE_SIG_TEST_METHOD1	334
6.1.2.13 INTERNAL_CATCH_DECLARE_SIG_TEST_METHOD_X	334
6.1.2.14 INTERNAL_CATCH_DECLARE_SIG_TEST_X	334
6.1.2.15 INTERNAL_CATCH_DEFINE_SIG_TEST1	334
6.1.2.16 INTERNAL_CATCH_DEFINE_SIG_TEST_METHOD1	335
6.1.2.17 INTERNAL_CATCH_DEFINE_SIG_TEST_METHOD_X	335
6.1.2.18 INTERNAL_CATCH_DEFINE_SIG_TEST_X	335
6.1.2.19 INTERNAL_CATCH_DYNAMIC_SECTION	335
6.1.2.20 INTERNAL_CATCH_ELSE	336
6.1.2.21 INTERNAL_CATCH_IF	336
6.1.2.22 INTERNAL_CATCH_METHOD_AS_TEST_CASE	336
6.1.2.23 INTERNAL_CATCH_MSG	336
6.1.2.24 INTERNAL_CATCH_NO_THROW	337
6.1.2.25 INTERNAL_CATCH_NTTP_1	337
6.1.2.26 INTERNAL_CATCH_NTTP_REGISTER	337
6.1.2.27 INTERNAL_CATCH_NTTP_REGISTER0	338
6.1.2.28 INTERNAL_CATCH_NTTP_REGISTER_METHOD	338
6.1.2.29 INTERNAL_CATCH_NTTP_REGISTER_METHOD0	338
6.1.2.30 INTERNAL_CATCH_REGISTER_ENUM	338
6.1.2.31 INTERNAL_CATCH_REGISTER_TESTCASE	339
6.1.2.32 INTERNAL_CATCH_SECTION	339
6.1.2.33 INTERNAL_CATCH_TEMPLATE_LIST_TEST_CASE_2	339
6.1.2.34 INTERNAL_CATCH_TEMPLATE_LIST_TEST_CASE_METHOD_2	340
6.1.2.35 INTERNAL_CATCH_TEMPLATE_TEST_CASE_2	340
6.1.2.36 INTERNAL_CATCH_TEMPLATE_TEST_CASE_METHOD_2	341
6.1.2.37 INTERNAL_CATCH_TEST	341
6.1.2.38 INTERNAL_CATCH_TEST_CASE_METHOD2	342
6.1.2.39 INTERNAL_CATCH_TESTCASE2	342
6.1.2.40 INTERNAL_CATCH_THROWS	343
6.1.2.41 INTERNAL_CATCH_THROWS_AS	343
6.1.2.42 INTERNAL_CATCH_THROWS_MATCHES	343
6.1.2.43 INTERNAL_CATCH_THROWS_STR_MATCHES	344
6.1.2.44 INTERNAL_CATCH_TRANSLATE_EXCEPTION2	344

6.1.2.45 INTERNAL_CHECK_THAT	345
6.1.3 Enumeration Type Documentation	345
6.1.3.1 ColourMode	345
6.1.3.2 GenerateFrom	345
6.1.3.3 ResultType	345
6.1.4 Function Documentation	346
6.1.4.1 Contains() [1/2]	346
6.1.4.2 Contains() [2/2]	346
6.1.4.3 convertIntoString()	346
6.1.4.4 defaultListListeners()	346
6.1.4.5 defaultListReporters()	347
6.1.4.6 defaultListTags()	347
6.1.4.7 defaultListTests()	347
6.1.4.8 makeStream()	347
6.1.4.9 operator&&() [1/2]	348
6.1.4.10 operator&&() [2/2]	348
6.1.4.11 operator" " () [1/2]	348
6.1.4.12 operator" " () [2/2]	348
6.1.4.13 parseReporterSpec()	349
6.1.4.14 Predicate()	349
6.1.4.15 registerReporterImpl()	349
6.1.4.16 ulpDistance()	349
Index	351

Chapter 1

Source code

Although `epiworld` is a header-only C++ library, we do make use of other cool projects in some of the examples and for testing. The `cxxopts` library provides a smooth interface for using options in your C++ program. `catch2` is a great C++ unit-tests framework that we have use in [other projects](#).

Although you are free to use `epiworld/`, we also have a single-header version that incorporates all its components [here](#).

Chapter 2

Hierarchical Index

2.1 Class Hierarchy

This inheritance list is sorted roughly, but not completely, alphabetically:

Catch::Clara::accept_many_t	21
Action< TSeq >	21
AdjList	23
Agent< TSeq >	24
Agent< int >	24
Agent< TSeq >	24
Agents< TSeq >	26
Catch::Approx	30
Catch::Clara::Args	34
Catch::Generators::as< T >	35
Catch::AssertionHandler	35
Catch::AssertionInfo	35
Catch::Detail::AssertionOrBenchmarkResult	36
Catch::AssertionReaction	36
Catch::AssertionResult	37
Catch::AssertionResultData	38
Catch::AssertionStats	39
Catch::Benchmark::Benchmark	43
Catch::Benchmark::Detail::BenchmarkFunction	43
Catch::BenchmarkInfo	44
Catch::BenchmarkStats< Duration >	45
Catch::Benchmark::Detail::bootstrap_analysis	47
Catch::Capturer	62
Catch::Matchers::CasedString	63
Catch::Detail::CaseInsensitiveEqualTo	63
Catch::Detail::CaseInsensitiveLess	63
Catch_global_namespace_dummy	64
Catch::Benchmark::Chronometer	64
Catch::Benchmark::Detail::ChronometerConcept	64
Catch::Benchmark::Detail::ChronometerModel< Clock >	65
Catch::Colour	68
Catch::ColourImpl::ColourGuard	68
Catch::ColourImpl	69
Catch::TextFlow::Column	70
Catch::TextFlow::Columns	71

Catch::Benchmark::Detail::CompleteInvoker< Result >	73
Catch::Benchmark::Detail::CompleteInvoker< void >	74
Catch::Benchmark::Detail::CompleteType< T >	74
Catch::Benchmark::Detail::CompleteType< void >	74
Catch::ConfigData	77
Catch::TextFlow::Column::const_iterator	82
Catch::Counts	87
DataBase< TSeq >	91
DataBase< int >	91
Catch::Decomposer	93
Entity< TSeq >	95
Catch::Detail::EnumInfo	95
Catch::Benchmark::Environment< Clock >	97
Catch::Benchmark::EnvironmentEstimate< Duration >	98
Catch::Benchmark::EnvironmentEstimate< FloatDuration< Clock > >	98
Catch::ErrnoGuard	100
Catch::Benchmark::Estimate< Duration >	100
Catch::Benchmark::Estimate< double >	100
Catch::EventListenerFactory	103
std::exception	
Catch::GeneratorException	113
Catch::ExceptionTranslatorRegistrar	105
Catch::Benchmark::ExecutionPlan< Duration >	106
Catch::ExprLhs< LhsT >	108
Catch::Clara::Detail::fake_arg	108
std::false_type	
Catch::Clara::Detail::is_unary_function< F, typename >	140
Catch::Detail::has_description< T, typename >	118
Catch::Detail::is_range_impl< T, typename >	137
Catch::is_range< T >	136
Catch::always_false< T >	28
Catch::FatalConditionHandler	109
Catch::FatalConditionHandlerGuard	109
Catch::TestSpec::FilterMatch	111
Catch::Generators::GeneratorUntypedBase	116
Catch::Generators::IGenerator< Float >	129
Catch::Generators::RandomFloatingGenerator< Float >	201
Catch::Generators::IGenerator< std::vector< T > >	129
Catch::Generators::ChunkGenerator< T >	66
Catch::Generators::IGenerator< Integer >	129
Catch::Generators::RandomIntegerGenerator< Integer >	203
Catch::Generators::IGenerator< T >	129
Catch::Generators::FilterGenerator< T, Predicate >	110
Catch::Generators::FixedValuesGenerator< T >	112
Catch::Generators::Generators< T >	114
Catch::Generators::IteratorGenerator< T >	146
Catch::Generators::MapGenerator< T, U, Func >	156
Catch::Generators::RangeGenerator< T >	204
Catch::Generators::RepeatGenerator< T >	211
Catch::Generators::SingleValueGenerator< T >	236
Catch::Generators::TakeGenerator< T >	260
Catch::Generators::GeneratorWrapper< T >	117
Catch::Generators::GeneratorWrapper< U >	117
Catch::Clara::Detail::HelpColumns	122
Catch::IContext	124
Catch::IMutableContext	130
Catch::IEventListener	125

Catch::EventListenerBase	101
Catch::MultiReporter	183
Catch::ReporterBase	212
Catch::CumulativeReporterBase	88
Catch::JUnitReporter	151
Catch::SonarQubeReporter	239
Catch::StreamingReporterBase	242
Catch::AutomakeReporter	40
Catch::CompactReporter	72
Catch::ConsoleReporter	80
Catch::TAPReporter	262
Catch::TeamCityReporter	264
Catch::XmlReporter	299
Catch::IExceptionTranslator	128
Catch::IExceptionTranslatorRegistry	128
Catch::ExceptionTranslatorRegistry	105
Catch::IGeneratorTracker	130
Catch::IMutableEnumValuesRegistry	131
Catch::Detail::EnumValuesRegistry	96
Catch::IMutableRegistryHub	132
std::integral_constant	
Catch::Matchers::Detail::conjunction< Cond, Rest... >	79
Catch::IRegistryHub	132
Catch::IReporterFactory	132
Catch::ReporterFactory< T >	216
Catch::IReporterRegistry	133
Catch::ReporterRegistry	218
Catch::IResultCapture	134
Catch::RunContext	224
Catch::is_callable< T >	135
Catch::is_callable_tester	136
std::is_same	
Catch::Benchmark::Detail::is_related< T, U >	139
Catch::ISingleton	143
Catch::Singleton< SingletonImplT, InterfaceT, MutableInterfaceT >	235
Catch::Detail::IsStreamInsertable< T >	144
Catch::IStream	144
Catch::ITagAliasRegistry	145
Catch::TagAliasRegistry	259
Catch::TextFlow::Columns::iterator	145
Catch::ITestCaseRegistry	147
Catch::TestRegistry	271
Catch::ITestInvoker	148
Catch::TestInvokerAsFunction	269
Catch::TestInvokerAsMethod< C >	270
Catch::TestCaseTracking::ITracker	148
Catch::TestCaseTracking::TrackerBase	279
Catch::TestCaseTracking::SectionTracker	232
Catch::ITransientExpression	150
Catch::BinaryExpr< LhsT, RhsT >	46
Catch::MatchExpr< ArgT, MatcherT >	168
Catch::UnaryExpr< LhsT >	282
Catch::Clara::Detail::LambdaInvoker< ReturnType >	152
Catch::Clara::Detail::LambdaInvoker< void >	153
Catch::LazyExpression	153

Catch::LeakDetector	153
LFMCMC< TData >	153
Catch::lineOfChars	155
Catch::ListenerDescription	155
Catch::ListenerRegistrar< T >	156
Catch::Detail::make_void<... >	156
Catch::Matchers::MatcherUntypedBase	167
Catch::Matchers::MatcherBase< double >	164
Catch::Matchers::WithinAbsMatcher	294
Catch::Matchers::WithinRelMatcher	296
Catch::Matchers::WithinUlpsMatcher	297
Catch::Matchers::MatcherBase< std::string >	164
Catch::Matchers::RegexMatcher	209
Catch::Matchers::StringMatcherBase	255
Catch::Matchers::EndsWithMatcher	94
Catch::Matchers::StartsWithMatcher	241
Catch::Matchers::StringContainsMatcher	245
Catch::Matchers::StringEqualsMatcher	246
Catch::Matchers::MatcherBase< std::vector< T, AllocMatch > >	164
Catch::Matchers::ApproxMatcher< T, AllocComp, AllocMatch >	31
Catch::Matchers::ContainsMatcher< T, AllocComp, AllocMatch >	85
Catch::Matchers::EqualsMatcher< T, AllocComp, AllocMatch >	99
Catch::Matchers::UnorderedEqualsMatcher< T, AllocComp, AllocMatch >	284
Catch::Matchers::MatcherBase< std::vector< T, Alloc > >	164
Catch::Matchers::VectorContainsElementMatcher< T, Alloc >	288
Catch::Matchers::MatcherBase< ArgT >	164
Catch::Matchers::Detail::MatchAllOf< ArgT >	158
Catch::Matchers::Detail::MatchAnyOf< ArgT >	161
Catch::Matchers::Detail::MatchNotOf< ArgT >	169
Catch::Matchers::MatcherBase< std::exception >	164
Catch::Matchers::ExceptionMessageMatcher	104
Catch::Matchers::MatcherBase< T >	164
Catch::Matchers::PredicateMatcher< T, Predicate >	198
Catch::Matchers::MatcherGenericBase	165
Catch::Matchers::AllMatchMatcher< Matcher >	27
Catch::Matchers::AnyMatchMatcher< Matcher >	29
Catch::Matchers::ContainsElementMatcher< T, Equality >	83
Catch::Matchers::ContainsMatcherMatcher< Matcher >	86
Catch::Matchers::Detail::MatchAllOfGeneric< MatcherTs >	159
Catch::Matchers::Detail::MatchAnyOfGeneric< MatcherTs >	162
Catch::Matchers::Detail::MatchNotOfGeneric< MatcherT >	171
Catch::Matchers::HasSizeMatcher	120
Catch::Matchers::IsEmptyMatcher	142
Catch::Matchers::NoneMatchMatcher< Matcher >	189
Catch::Matchers::SizeMatchesMatcher< Matcher >	238
Catch::MessageInfo	173
Catch::MessageStream	174
Catch::MessageBuilder	172
Model< TSeq >	175
Model< int >	175
Model< TSeq >	175
Catch::TestCaseTracking::NameAndLocation	186
Catch::NameAndTags	187
Catch::CumulativeReporterBase::Node< T, ChildNodeT >	187
Catch::Detail::NonCopyable	188
Catch::AutoReg	41
Catch::Clara::Detail::BoundRef	57

Catch::Clara::Detail::BoundFlagRefBase	52
Catch::Clara::Detail::BoundFlagLambda< L >	48
Catch::Clara::Detail::BoundFlagRef	50
Catch::Clara::Detail::BoundValueRefBase	61
Catch::Clara::Detail::BoundLambda< L >	53
Catch::Clara::Detail::BoundManyLambda< L >	55
Catch::Clara::Detail::BoundValueRef< T >	58
Catch::Clara::Detail::BoundValueRef< std::vector< T > >	60
Catch::IConfig	123
Catch::Config	76
Catch::ReusableStringStream	223
Catch::Section	228
Catch::Session	233
Catch::TestCaseInfo	266
Catch::Benchmark::now< Clock >	190
Catch::Benchmark::Detail::ObjectStorage< T, Destruct >	190
Catch::Optional< T >	193
Catch::Optional< Catch::AssertionResult >	193
Catch::Optional< Catch::AssertionStats >	193
Catch::Optional< Catch::BenchmarkStats<> >	193
Catch::Optional< ColourMode >	193
Catch::Optional< std::string >	193
Catch::Benchmark::OutlierClassification	193
Catch::Clara::Detail::ParserBase	195
Catch::Clara::Detail::ComposableParserImpl< ExeName >	75
Catch::Clara::ExeName	107
Catch::Clara::Detail::ComposableParserImpl< DerivedT >	75
Catch::Clara::Detail::ParserRefImpl< Opt >	196
Catch::Clara::Opt	191
Catch::Clara::Help	121
Catch::Clara::Detail::ParserRefImpl< Arg >	196
Catch::Clara::Arg	33
Catch::Clara::Detail::ParserRefImpl< DerivedT >	196
Catch::Clara::Parser	194
Catch::Clara::Detail::ParseState	197
PersonTools< TSeq >	197
Catch::pluralise	198
Catch::ProcessedReporterSpec	199
Progress	200
Queue< TSeq >	200
Queue< int >	200
RandGraph	201
Catch::ratio_string< Ratio >	206
Catch::ratio_string< std::atto >	206
Catch::ratio_string< std::femto >	206
Catch::ratio_string< std::micro >	206
Catch::ratio_string< std::milli >	207
Catch::ratio_string< std::nano >	207
Catch::ratio_string< std::pico >	207
Catch::RedirectedStdErr	207
Catch::RedirectedStdOut	208
Catch::RedirectedStream	208
Catch::RedirectedStreams	208
Catch::RegistrarForTagAliases	210
Catch::Benchmark::Detail::repeater< Fun >	210
Catch::ReporterConfig	215
Catch::ReporterDescription	215

Catch::ReporterPreferences	216
Catch::ReporterRegistrar< T >	217
Catch::ReporterSpec	219
Catch::Clara::Detail::ResultBase	219
Catch::Clara::Detail::ResultValueBase< T >	220
Catch::Clara::Detail::ResultValueBase< void >	222
Catch::Clara::Detail::BasicResult< T >	42
Catch::ResultDisposition	220
Catch::ResultWas	223
Catch::Benchmark::SampleAnalysis< Duration >	226
Catch::XmlWriter::ScopedElement	226
Catch::ScopedMessage	227
Catch::SectionEndInfo	229
Catch::SectionInfo	229
Catch::CumulativeReporterBase::SectionNode	230
Catch::SectionStats	231
Catch::SimplePcg32	234
SingletonImplT	
Catch::Singleton< SingletonImplT, InterfaceT, MutableInterfaceT >	235
Catch::SourceLineInfo	240
Catch::StartupExceptionRegistry	242
Catch::StreamEndStop	242
Catch::StringMaker< T, typename >	247
Catch::StringMaker< bool >	247
Catch::StringMaker< Catch::Approx >	247
Catch::StringMaker< char * >	247
Catch::StringMaker< char >	248
Catch::StringMaker< char const * >	248
Catch::StringMaker< char[SZ]>	248
Catch::StringMaker< double >	248
Catch::StringMaker< float >	249
Catch::StringMaker< int >	249
Catch::StringMaker< long >	249
Catch::StringMaker< long long >	249
Catch::StringMaker< R C::* >	250
Catch::StringMaker< R, std::enable_if_t< is_range< R >::value &&!::Catch::Detail::IsStreamInsertable< R >::value >>	250
Catch::StringMaker< signed char >	250
Catch::StringMaker< signed char[SZ]>	250
Catch::StringMaker< std::chrono::duration< Value, Ratio > >	251
Catch::StringMaker< std::chrono::duration< Value, std::ratio< 1 > > >	251
Catch::StringMaker< std::chrono::duration< Value, std::ratio< 3600 > > >	251
Catch::StringMaker< std::chrono::duration< Value, std::ratio< 60 > > >	251
Catch::StringMaker< std::chrono::time_point< Clock, Duration > >	252
Catch::StringMaker< std::chrono::time_point< std::chrono::system_clock, Duration > >	252
Catch::StringMaker< std::nullptr_t >	252
Catch::StringMaker< std::string >	252
Catch::StringMaker< std::wstring >	253
Catch::StringMaker< T * >	253
Catch::StringMaker< T[SZ]>	253
Catch::StringMaker< unsigned char >	253
Catch::StringMaker< unsigned char[SZ]>	254
Catch::StringMaker< unsigned int >	254
Catch::StringMaker< unsigned long >	254
Catch::StringMaker< unsigned long long >	254
Catch::StringMaker< wchar_t * >	255
Catch::StringMaker< wchar_t const * >	255
Catch::StringRef	256

Catch::Tag	257
Catch::TagAlias	258
Catch::TagInfo	259
decltypeis_callable_tester::test	
Catch::is_callable< Fun(Args...)>	135
Catch::TestCaseHandle	265
Catch::TestCaseInfoHasher	267
Catch::TestCaseStats	268
Catch::TestFailureException	268
Catch::TestRunInfo	272
Catch::TestRunStats	272
Catch::TestSpec	273
Catch::TestSpecParser	274
Catch::Timer	274
Catch::Benchmark::Timing< Duration, Result >	274
Catch::Clara::Detail::Token	274
Catch::Clara::Detail::TokenStream	275
Tool< TSeq >	275
Tools< TSeq >	276
Tools_const< TSeq >	277
Catch::Totals	278
Catch::TestCaseTracking::TrackerContext	280
std::true_type	
Catch::Clara::Detail::is_unary_function< F, Catch::Detail::void_t< decltype(std::declval< F >())(fake← _arg())> >	141
Catch::Detail::has_description< T, void_t< decltype(T::getDescription())> >	119
Catch::Detail::is_range_impl< T, void_t< decltype(begin(std::declval< T >()))> >	138
Catch::Matchers::Detail::conjunction< Cond >	78
Catch::true_given< typename >	281
Catch::Benchmark::Detail::CompleteType< void >::type	281
Catch::Clara::Detail::UnaryLambdaTraits< L >	282
Catch::Clara::Detail::UnaryLambdaTraits< ReturnT(ClassT::*)(Args...) const >	283
Catch::Clara::Detail::UnaryLambdaTraits< ReturnT(ClassT::*)(ArgT) const >	283
Catch::Detail::unique_ptr< T >	283
Catch::Detail::unique_ptr< callable >	283
Catch::Detail::unique_ptr< Catch::ColourImpl >	283
Catch::Detail::unique_ptr< Catch::Config >	283
Catch::Detail::unique_ptr< Catch::CumulativeReporterBase::Node >	283
Catch::Detail::unique_ptr< Catch::CumulativeReporterBase::SectionNode >	283
Catch::Detail::unique_ptr< Catch::IStream >	283
Catch::Detail::unique_ptr< IEventListener >	283
Catch::Detail::unique_ptr< ITracker >	283
Catch::Detail::unique_ptr< TablePrinter >	283
UserData< TSeq >	285
vecHasher< T >	287
Catch::Version	289
Virus< TSeq >	290
Viruses< TSeq >	292
Viruses_const< TSeq >	292
Catch::WaitForKeypress	293
Catch::WarnAbout	293
Catch::WildcardPattern	294
Catch::XmlEncode	298
Catch::XmlWriter	302

Chapter 3

Class Index

3.1 Class List

Here are the classes, structs, unions and interfaces with brief descriptions:

Catch::Clara::accept_many_t	21
Action< TSeq >	
Action data for update an agent	21
AdjList	23
Agent< TSeq >	
Agent (agents)	24
Agents< TSeq >	26
Catch::Matchers::AllMatchMatcher< Matcher >	27
Catch::always_false< T >	28
Catch::Matchers::AnyMatchMatcher< Matcher >	29
Catch::Approx	30
Catch::Matchers::ApproxMatcher< T, AllocComp, AllocMatch >	31
Catch::Clara::Arg	33
Catch::Clara::Args	34
Catch::Generators::as< T >	35
Catch::AssertionHandler	35
Catch::AssertionInfo	35
Catch::Detail::AssertionOrBenchmarkResult	
Represents either an assertion or a benchmark result to be handled by cumulative reporter later	36
Catch::AssertionReaction	36
Catch::AssertionResult	37
Catch::AssertionResultData	38
Catch::AssertionStats	39
Catch::AutomakeReporter	40
Catch::AutoReg	41
Catch::Clara::Detail::BasicResult< T >	42
Catch::Benchmark::Benchmark	43
Catch::Benchmark::Detail::BenchmarkFunction	43
Catch::BenchmarkInfo	44
Catch::BenchmarkStats< Duration >	45
Catch::BinaryExpr< LhsT, Rhst >	46
Catch::Benchmark::Detail::bootstrap_analysis	47
Catch::Clara::Detail::BoundFlagLambda< L >	48
Catch::Clara::Detail::BoundFlagRef	50
Catch::Clara::Detail::BoundFlagRefBase	52

Catch::Clara::Detail::BoundLambda< L >	53
Catch::Clara::Detail::BoundManyLambda< L >	55
Catch::Clara::Detail::BoundRef	57
Catch::Clara::Detail::BoundValueRef< T >	58
Catch::Clara::Detail::BoundValueRef< std::vector< T > >	60
Catch::Clara::Detail::BoundValueRefBase	61
Catch::Catcher	62
Catch::Matchers::CasedString	63
Catch::Detail::CaseInsensitiveEqualTo	
Provides case-insensitive op== semantics when called	63
Catch::Detail::CaseInsensitiveLess	
Provides case-insensitive op< semantics when called	63
Catch_global_namespace_dummy	64
Catch::Benchmark::Chronometer	64
Catch::Benchmark::Detail::ChronometerConcept	64
Catch::Benchmark::Detail::ChronometerModel< Clock >	65
Catch::Generators::ChunkGenerator< T >	66
Catch::Colour	68
Catch::ColourImpl::ColourGuard	68
Catch::ColourImpl	69
Catch::TextFlow::Column	70
Catch::TextFlow::Columns	71
Catch::CompactReporter	72
Catch::Benchmark::Detail::CompleteInvoker< Result >	73
Catch::Benchmark::Detail::CompleteInvoker< void >	74
Catch::Benchmark::Detail::CompleteType< T >	74
Catch::Benchmark::Detail::CompleteType< void >	74
Catch::Clara::Detail::ComposableParserImpl< DerivedT >	75
Catch::Config	76
Catch::ConfigData	77
Catch::Matchers::Detail::conjunction< Cond >	78
Catch::Matchers::Detail::conjunction< Cond, Rest... >	79
Catch::ConsoleReporter	80
Catch::TextFlow::Column::const_iterator	82
Catch::Matchers::ContainsElementMatcher< T, Equality >	
Matcher for checking that an element in range is equal to specific element	83
Catch::Matchers::ContainsMatcher< T, AllocComp, AllocMatch >	85
Catch::Matchers::ContainsMatcherMatcher< Matcher >	
Meta-matcher for checking that an element in a range matches a specific matcher	86
Catch::Counts	87
Catch::CumulativeReporterBase	88
DataBase< TSeq >	
Statistical data about the process	91
Catch::Decomposer	93
Catch::Matchers::EndsWithMatcher	94
Entity< TSeq >	95
Catch::Detail::EnumInfo	95
Catch::Detail::EnumValuesRegistry	96
Catch::Benchmark::Environment< Clock >	97
Catch::Benchmark::EnvironmentEstimate< Duration >	98
Catch::Matchers::EqualsMatcher< T, AllocComp, AllocMatch >	99
Catch::ErrnoGuard	100
Catch::Benchmark::Estimate< Duration >	100
Catch::EventListenerBase	101
Catch::EventListenerFactory	103
Catch::Matchers::ExceptionMessageMatcher	104
Catch::ExceptionTranslatorRegistrar	105
Catch::ExceptionTranslatorRegistry	105

Catch::Benchmark::ExecutionPlan< Duration >	106
Catch::Clara::ExeName	107
Catch::ExprLhs< LhsT >	108
Catch::Clara::Detail::fake_arg	108
Catch::FatalConditionHandler	109
Catch::FatalConditionHandlerGuard	
Simple RAII guard for (dis)engaging the FatalConditionHandler	109
Catch::Generators::FilterGenerator< T, Predicate >	110
Catch::TestSpec::FilterMatch	111
Catch::Generators::FixedValuesGenerator< T >	112
Catch::GeneratorException	113
Catch::Generators::Generators< T >	114
Catch::Generators::GeneratorUntypedBase	116
Catch::Generators::GeneratorWrapper< T >	117
Catch::Detail::has_description< T, typename >	118
Catch::Detail::has_description< T, void_t< decltype(T::getDescription())> >	119
Catch::Matchers::HasSizeMatcher	120
Catch::Clara::Help	121
Catch::Clara::Detail::HelpColumns	122
Catch::IConfig	123
Catch::IContext	124
Catch::IEventListener	125
Catch::IExceptionTranslator	128
Catch::IExceptionTranslatorRegistry	128
Catch::Generators::IGenerator< T >	129
Catch::IGeneratorTracker	130
Catch::IMutableContext	130
Catch::IMutableEnumValuesRegistry	131
Catch::IMutableRegistryHub	132
Catch::IRegistryHub	132
Catch::IReporterFactory	132
Catch::IReporterRegistry	133
Catch::IResultCapture	134
Catch::is_callable< T >	135
Catch::is_callable< Fun(Args...)>	135
Catch::is_callable_tester	136
Catch::is_range< T >	136
Catch::Detail::is_range_impl< T, typename >	137
Catch::Detail::is_range_impl< T, void_t< decltype(begin(std::declval< T >()))> >	138
Catch::Benchmark::Detail::is_related< T, U >	139
Catch::Clara::Detail::is_unary_function< F, typename >	140
Catch::Clara::Detail::is_unary_function< F, Catch::Detail::void_t< decltype(std::declval< F >()(fake_arg))> >	
141	
Catch::Matchers::IsEmptyMatcher	142
Catch::ISingleton	143
Catch::Detail::IsStreamInsertable< T >	144
Catch::IStream	144
Catch::ITagAliasRegistry	145
Catch::TextFlow::Columns::iterator	145
Catch::Generators::IteratorGenerator< T >	146
Catch::ITestCaseRegistry	147
Catch::ITestInvoker	148
Catch::TestCaseTracking::ITracker	148
Catch::ITransientExpression	150
Catch::JUnitReporter	151
Catch::Clara::Detail::LambdaInvoker< ReturnType >	152
Catch::Clara::Detail::LambdaInvoker< void >	153
Catch::LazyExpression	153

Catch::LeakDetector	153
LFMCMC< TData >	
Likelihood-Free Markov Chain Monte Carlo	153
Catch::lineOfChars	155
Catch::ListenerDescription	155
Catch::ListenerRegistrar< T >	156
Catch::Detail::make_void<... >	156
Catch::Generators::MapGenerator< T, U, Func >	156
Catch::Matchers::Detail::MatchAllOf< ArgT >	158
Catch::Matchers::Detail::MatchAllOfGeneric< MatcherTs >	159
Catch::Matchers::Detail::MatchAnyOf< ArgT >	161
Catch::Matchers::Detail::MatchAnyOfGeneric< MatcherTs >	162
Catch::Matchers::MatcherBase< T >	164
Catch::Matchers::MatcherGenericBase	165
Catch::Matchers::MatcherUntypedBase	167
Catch::MatchExpr< ArgT, MatcherT >	168
Catch::Matchers::Detail::MatchNotOf< ArgT >	169
Catch::Matchers::Detail::MatchNotOfGeneric< MatcherT >	171
Catch::MessageBuilder	172
Catch::MessageInfo	173
Catch::MessageStream	174
Model< TSeq >	
Core class of epiworld	175
Catch::MultiReporter	183
Catch::TestCaseTracking::NameAndLocation	186
Catch::NameAndTags	187
Catch::CumulativeReporterBase::Node< T, ChildNodeT >	187
Catch::Detail::NonCopyable	
Deriving classes become noncopyable and nonmovable	188
Catch::Matchers::NoneMatchMatcher< Matcher >	189
Catch::Benchmark::now< Clock >	190
Catch::Benchmark::Detail::ObjectStorage< T, Destruct >	190
Catch::Clara::Opt	191
Catch::Optional< T >	193
Catch::Benchmark::OutlierClassification	193
Catch::Clara::Parser	194
Catch::Clara::Detail::ParserBase	195
Catch::Clara::Detail::ParserRefImpl< DerivedT >	196
Catch::Clara::Detail::ParseState	197
PersonTools< TSeq >	197
Catch::pluralise	198
Catch::Matchers::PredicateMatcher< T, Predicate >	198
Catch::ProcessedReporterSpec	199
Progress	
A simple progress bar	200
Queue< TSeq >	
Controls which agents are verified at each step	200
RandGraph	201
Catch::Generators::RandomFloatingGenerator< Float >	201
Catch::Generators::RandomIntegerGenerator< Integer >	203
Catch::Generators::RangeGenerator< T >	204
Catch::ratio_string< Ratio >	206
Catch::ratio_string< std::atto >	206
Catch::ratio_string< std::femto >	206
Catch::ratio_string< std::micro >	206
Catch::ratio_string< std::milli >	207
Catch::ratio_string< std::nano >	207
Catch::ratio_string< std::pico >	207

Catch::RedirectedStdErr	207
Catch::RedirectedStdOut	208
Catch::RedirectedStream	208
Catch::RedirectedStreams	208
Catch::Matchers::RegexMatcher	209
Catch::RegistrarForTagAliases	210
Catch::Benchmark::Detail::repeater< Fun >	210
Catch::Generators::RepeatGenerator< T >	211
Catch::ReporterBase	212
Catch::ReporterConfig	215
Catch::ReporterDescription	215
Catch::ReporterFactory< T >	216
Catch::ReporterPreferences	216
Catch::ReporterRegistrar< T >	217
Catch::ReporterRegistry	218
Catch::ReporterSpec	219
Catch::Clara::Detail::ResultBase	219
Catch::ResultDisposition	220
Catch::Clara::Detail::ResultValueBase< T >	220
Catch::Clara::Detail::ResultValueBase< void >	222
Catch::ResultWas	223
Catch::ReusableStringStream	223
Catch::RunContext	224
Catch::Benchmark::SampleAnalysis< Duration >	226
Catch::XmlWriter::ScopedElement	226
Catch::ScopedMessage	227
Catch::Section	228
Catch::SectionEndInfo	229
Catch::SectionInfo	229
Catch::CumulativeReporterBase::SectionNode	230
Catch::SectionStats	231
Catch::TestCaseTracking::SectionTracker	232
Catch::Session	233
Catch::SimplePcg32	234
Catch::Singleton< SingletonImplT, InterfaceT, MutableInterfaceT >	235
Catch::Generators::SingleValueGenerator< T >	236
Catch::Matchers::SizeMatchesMatcher< Matcher >	238
Catch::SonarQubeReporter	239
Catch::SourceLineInfo	240
Catch::Matchers::StartsWithMatcher	241
Catch::StartupExceptionRegistry	242
Catch::StreamEndStop	242
Catch::StreamingReporterBase	242
Catch::Matchers::StringContainsMatcher	245
Catch::Matchers::StringEqualsMatcher	246
Catch::StringMaker< T, typename >	247
Catch::StringMaker< bool >	247
Catch::StringMaker< Catch::Approx >	247
Catch::StringMaker< char * >	247
Catch::StringMaker< char >	248
Catch::StringMaker< char const * >	248
Catch::StringMaker< char[SZ]>	248
Catch::StringMaker< double >	248
Catch::StringMaker< float >	249
Catch::StringMaker< int >	249
Catch::StringMaker< long >	249
Catch::StringMaker< long long >	249
Catch::StringMaker< R C::* >	250

Catch::StringMaker< R, std::enable_if_t< is_range< R >::value &&!::Catch::Detail::IsStreamInsertable< R >::value > > 250	
Catch::StringMaker< signed char >	250
Catch::StringMaker< signed char[SZ]>	250
Catch::StringMaker< std::chrono::duration< Value, Ratio > >	251
Catch::StringMaker< std::chrono::duration< Value, std::ratio< 1 > > >	251
Catch::StringMaker< std::chrono::duration< Value, std::ratio< 3600 > > >	251
Catch::StringMaker< std::chrono::duration< Value, std::ratio< 60 > > >	251
Catch::StringMaker< std::chrono::time_point< Clock, Duration > >	252
Catch::StringMaker< std::chrono::time_point< std::chrono::system_clock, Duration > >	252
Catch::StringMaker< std::nullptr_t >	252
Catch::StringMaker< std::string >	252
Catch::StringMaker< std::wstring >	253
Catch::StringMaker< T * >	253
Catch::StringMaker< T[SZ]>	253
Catch::StringMaker< unsigned char >	253
Catch::StringMaker< unsigned char[SZ]>	254
Catch::StringMaker< unsigned int >	254
Catch::StringMaker< unsigned long >	254
Catch::StringMaker< unsigned long long >	254
Catch::StringMaker< wchar_t * >	255
Catch::StringMaker< wchar_t const * >	255
Catch::Matchers::StringMatcherBase	255
Catch::StringRef	256
Catch::Tag	257
Catch::TagAlias	258
Catch::TagAliasRegistry	259
Catch::TagInfo	259
Catch::Generators::TakeGenerator< T >	260
Catch::TAPReporter	262
Catch::TeamCityReporter	264
Catch::TestCaseHandle	265
Catch::TestCaseInfo	266
Catch::TestCaseInfoHasher	267
Catch::TestCaseStats	268
Catch::TestFailureException Used to signal that an assertion macro failed	268
Catch::TestInvokerAsFunction	269
Catch::TestInvokerAsMethod< C >	270
Catch::TestRegistry	271
Catch::TestRunInfo	272
Catch::TestRunStats	272
Catch::TestSpec	273
Catch::TestSpecParser	274
Catch::Timer	274
Catch::Benchmark::Timing< Duration, Result >	274
Catch::Clara::Detail::Token	274
Catch::Clara::Detail::TokenStream	275
Tool< TSeq > Tools for defending the agent against the virus	275
Tools< TSeq > Set of tools (useful for building iterators)	276
Tools_const< TSeq > Set of Tools (const) (useful for iterators)	277
Catch::Totals	278
Catch::TestCaseTracking::TrackerBase	279
Catch::TestCaseTracking::TrackerContext	280
Catch::true_given< typename >	281

Catch::Benchmark::Detail::CompleteType< void >::type	281
Catch::UnaryExpr< LhsT >	282
Catch::Clara::Detail::UnaryLambdaTraits< L >	282
Catch::Clara::Detail::UnaryLambdaTraits< ReturnT(ClassT::*)(Args...) const >	283
Catch::Clara::Detail::UnaryLambdaTraits< ReturnT(ClassT::*)(ArgT) const >	283
Catch::Detail::unique_ptr< T >	283
Catch::Matchers::UnorderedEqualsMatcher< T, AllocComp, AllocMatch >	284
UserData< TSeq >	
Personalized data by the user	285
vecHasher< T >	
Vector hasher	287
Catch::Matchers::VectorContainsElementMatcher< T, Alloc >	288
Catch::Version	289
Virus< TSeq >	
Virus	290
Viruses< TSeq >	
Set of viruses (useful for building iterators)	292
Viruses_const< TSeq >	
Set of Viruses (const) (useful for iterators)	292
Catch::WaitForKeypress	293
Catch::WarnAbout	293
Catch::WildcardPattern	294
Catch::Matchers::WithinAbsMatcher	294
Catch::Matchers::WithinRelMatcher	296
Catch::Matchers::WithinUlpMatcher	297
Catch::XmlEncode	298
Catch::XmlReporter	299
Catch::XmlWriter	302

Chapter 4

File Index

4.1 File List

Here is a list of all documented files with brief descriptions:

include/catch2/catch_amalgamated.hpp	303
include/epiworld/adjlist-bones.hpp	??
include/epiworld/adjlist-meat.hpp	??
include/epiworld/agent-bones.hpp	??
include/epiworld/agent-meat-status.hpp	??
include/epiworld/agent-meat.hpp	??
include/epiworld/agents-bones.hpp	??
include/epiworld/config.hpp	??
include/epiworld/database-bones.hpp	??
include/epiworld/database-meat.hpp	??
include/epiworld/entity-bones.hpp	??
include/epiworld/epiworld-macros.hpp	??
include/epiworld/epiworld.hpp	??
include/epiworld/misc.hpp	??
include/epiworld/model-bones.hpp	??
include/epiworld/model-meat-print.hpp	??
include/epiworld/model-meat.hpp	??
include/epiworld/progress.hpp	??
include/epiworld/queue-bones.hpp	??
include/epiworld/randgraph.hpp	??
include/epiworld/random_graph.hpp	??
include/epiworld/seq_processing.hpp	??
include/epiworld/tool-bones.hpp	??
include/epiworld/tool-meat.hpp	??
include/epiworld/tools-bones.hpp	??
include/epiworld/userdata-bones.hpp	??
include/epiworld/userdata-meat.hpp	??
include/epiworld/virus-bones.hpp	??
include/epiworld/virus-meat.hpp	??
include/epiworld/viruses-bones.hpp	??
include/epiworld/math/lfmcmc.hpp	??
include/epiworld/math/lfmcmc/lfmcmc-bones.hpp	??
include/epiworld/math/lfmcmc/lfmcmc-meat-print.hpp	??
include/epiworld/math/lfmcmc/lfmcmc-meat.hpp	??
include/epiworld/models/immune_system.hpp	??

include/epiworld/models/ seirconnected.hpp	??
include/epiworld/models/ sir.hpp	??
include/epiworld/models/ sirconnected.hpp	??
include/epiworld/models/ surveillance.hpp	??

Chapter 5

Class Documentation

5.1 Catch::Clara::accept_many_t Struct Reference

The documentation for this struct was generated from the following file:

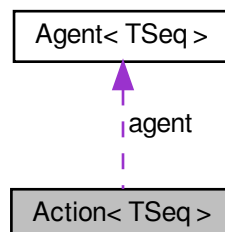
- [include/catch2/catch_amalgamated.hpp](#)

5.2 Action< TSeq > Struct Template Reference

[Action](#) data for update an agent.

```
#include <config.hpp>
```

Collaboration diagram for Action< TSeq >:



Public Member Functions

- [Action](#) ([Agent](#)< TSeq > *agent_, VirusPtr< TSeq > virus_, ToolPtr< TSeq > tool_, epiworld_fast_int new←_status_, epiworld_fast_int queue_, ActionFun< TSeq > call_)
Construct a new [Action](#) object.

Public Attributes

- [Agent](#)< TSeq > * **agent**
- VirusPtr< TSeq > **virus**
- ToolPtr< TSeq > **tool**
- epiworld_fast_int **new_status**
- epiworld_fast_int **queue**
- ActionFun< TSeq > **call**

5.2.1 Detailed Description

```
template<typename TSeq>
struct Action< TSeq >
```

[Action](#) data for update an agent.

Template Parameters

<i>TSeq</i>	
-------------	--

5.2.2 Constructor & Destructor Documentation

5.2.2.1 Action()

```
template<typename TSeq >
Action< TSeq >::Action (
    Agent< TSeq > * agent_,
    VirusPtr< TSeq > virus_,
    ToolPtr< TSeq > tool_,
    epiworld_fast_int new_status_,
    epiworld_fast_int queue_,
    ActionFun< TSeq > call_ ) [inline]
```

Construct a new [Action](#) object.

All the parameters are rather optional.

Parameters

<i>agent_</i>	Agent over who the action will happen
<i>virus_</i>	Virus to add
<i>tool_</i>	Tool to add
<i>virus_idx</i>	Index of virus to be removed (if needed)
<i>tool_idx</i>	Index of tool to be removed (if needed)
<i>new_↔ status_</i>	Next status
<i>queue_</i>	Effect on the queue
<i>call_</i>	The action call (if needed)

The documentation for this struct was generated from the following files:

- include/epiworld/agent-bones.hpp
- include/epiworld/config.hpp

5.3 AdjList Class Reference

Public Member Functions

- [AdjList](#) (const std::vector< unsigned int > &source, const std::vector< unsigned int > &target, int size, bool directed)
Construct a new Adj List object.
- void [read_edgelist](#) (std::string fn, int size, int skip=0, bool directed=true)
Read an edgelist.
- std::map< unsigned int, unsigned int > **operator()** (unsigned int i) const
- void **print** (unsigned int limit=20u) const
- size_t [vcount](#) () const
Number of vertices/nodes in the network.
- size_t [ecount](#) () const
Number of edges/arcs/ties in the network.
- std::vector< std::map< unsigned int, unsigned int > > & **get_dat** ()
- bool [is_directed](#) () const
true if the network is directed.

5.3.1 Constructor & Destructor Documentation

5.3.1.1 AdjList()

```
AdjList::AdjList (
    const std::vector< unsigned int > & source,
    const std::vector< unsigned int > & target,
    int size,
    bool directed ) [inline]
```

Construct a new Adj List object.

Ids in the network are assume to range from 0 to `size - 1`.

Parameters

<i>source</i>	Unsigned int vector with the source
<i>target</i>	Unsigned int vector with the target
<i>size</i>	Number of vertices in the network.
<i>directed</i>	Bool true if the network is directed

5.3.2 Member Function Documentation

5.3.2.1 read_edgelist()

```
void AdjList::read_edgelist (
    std::string fn,
    int size,
    int skip = 0,
    bool directed = true ) [inline]
```

Read an edgelist.

Ids in the network are assume to range from 0 to `size - 1`.

Parameters

<i>fn</i>	Path to the file
<i>skip</i>	Number of lines to skip (e.g., 1 if there's a header)
<i>directed</i>	<code>true</code> if the network is directed
<i>size</i>	Number of vertices in the network.

The documentation for this class was generated from the following files:

- `include/epiworld/adjlist-bones.hpp`
- `include/epiworld/adjlist-meat.hpp`

5.4 Agent< TSeq > Class Template Reference

[Agent](#) (agents)

```
#include <agent-bones.hpp>
```

Public Member Functions

- **Agent** (const [Agent](#)< TSeq > &p)
- int [get_id](#) () const
Id of the individual.
- std::mt19937 * **get_rand_engine** ()
- [Model](#)< TSeq > * **get_model** ()
- VirusPtr< TSeq > & **get_virus** (int i)
- [Viruses](#)< TSeq > **get_viruses** ()
- const [Viruses_const](#)< TSeq > **get_viruses** () const
- size_t **get_n_viruses** () const noexcept
- ToolPtr< TSeq > & **get_tool** (int i)
- [Tools](#)< TSeq > **get_tools** ()
- const [Tools_const](#)< TSeq > **get_tools** () const

- `size_t get_n_tools ()` const noexcept
- `void mutate_variant ()`
- `void add_neighbor (Agent< TSeq > *p, bool check_source=true, bool check_target=true)`
- `std::vector< Agent< TSeq > * > & get_neighbors ()`
- `void change_status (epiworld_fast_uint new_status, epiworld_fast_int queue=0)`
- `const epiworld_fast_uint & get_status ()` const
- `void reset ()`
- `bool has_tool (unsigned int t)` const
- `bool has_tool (std::string name)` const
- `bool has_virus (unsigned int t)` const
- `bool has_virus (std::string name)` const
- `void print (bool compressed=false)` const

Add/Remove Virus/Tool

Any of these is ultimately reflected at the end of the iteration.

Parameters

tool	<i>Tool to add</i>
virus	<i>Virus to add</i>
status_new	<i>Status after the change</i>
queue	

- `void add_tool (ToolPtr< TSeq > tool, epiworld_fast_int status_new=-99, epiworld_fast_int queue=-99)`
- `void add_tool (Tool< TSeq > tool, epiworld_fast_int status_new=-99, epiworld_fast_int queue=-99)`
- `void add_virus (VirusPtr< TSeq > virus, epiworld_fast_int status_new=-99, epiworld_fast_int queue=-99)`
- `void add_virus (Virus< TSeq > virus, epiworld_fast_int status_new=-99, epiworld_fast_int queue=-99)`
- `void rm_tool (epiworld_fast_uint tool_idx, epiworld_fast_int status_new=-99, epiworld_fast_int queue=-99)`
- `void rm_tool (ToolPtr< TSeq > &tool, epiworld_fast_int status_new=-99, epiworld_fast_int queue=-99)`
- `void rm_virus (epiworld_fast_uint virus_idx, epiworld_fast_int status_new=-99, epiworld_fast_int queue=-99)`
- `void rm_virus (VirusPtr< TSeq > &virus, epiworld_fast_int status_new=-99, epiworld_fast_int queue=-99)`
- `void rm_agent_by_virus (epiworld_fast_uint virus_idx, epiworld_fast_int status_new=-99, epiworld_fast_int queue=-99)`
Agent removed by virus.
- `void rm_agent_by_virus (VirusPtr< TSeq > &virus, epiworld_fast_int status_new=-99, epiworld_fast_int queue=-99)`
Agent removed by virus.

Get the rates (multipliers) for the agent

Parameters

v	<i>A pointer to a virus.</i>
---	------------------------------

Returns

epiworld_double

- `epiworld_double get_susceptibility_reduction (VirusPtr< TSeq > v)`
- `epiworld_double get_transmission_reduction (VirusPtr< TSeq > v)`
- `epiworld_double get_recovery_enhancer (VirusPtr< TSeq > v)`

- `epiworld_double` **get_death_reduction** (`VirusPtr< TSeq > v`)

Friends

- class **Model**< TSeq >
- class **Virus**< TSeq >
- class **Viruses**< TSeq >
- class **Viruses_const**< TSeq >
- class **Tool**< TSeq >
- class **Tools**< TSeq >
- class **Queue**< TSeq >
- void **default_add_virus** (`Action< TSeq > &a`, `Model< TSeq > *m`)
- void **default_add_tool** (`Action< TSeq > &a`, `Model< TSeq > *m`)
- void **default_rm_virus** (`Action< TSeq > &a`, `Model< TSeq > *m`)
- void **default_rm_tool** (`Action< TSeq > &a`, `Model< TSeq > *m`)

5.4.1 Detailed Description

```
template<typename TSeq = int>
class Agent< TSeq >
```

[Agent](#) (agents)

Template Parameters

<i>TSeq</i>	Sequence type (should match TSeq across the model)
-------------	--

The documentation for this class was generated from the following file:

- `include/epiworld/agent-bones.hpp`

5.5 Agents< TSeq > Class Template Reference

Public Member Functions

- [Agents](#) ()=delete
Default constructor.
- [Agents](#) (const [Agents](#)< TSeq > &a)=delete
Copy constructor.
- [Agents](#) ([Agents](#)< TSeq > &&a)=delete
Move constructor.
- **Agents** (`Model< TSeq > &model_`)
- **Agents** (`Entity< TSeq > &entity_`)
- `std::vector< Agent< TSeq > * >::iterator` **begin** ()
- `std::vector< Agent< TSeq > * >::iterator` **end** ()
- `Agent< TSeq > * operator[] (size_t n)`
- `Agent< TSeq > * operator() (size_t n)`

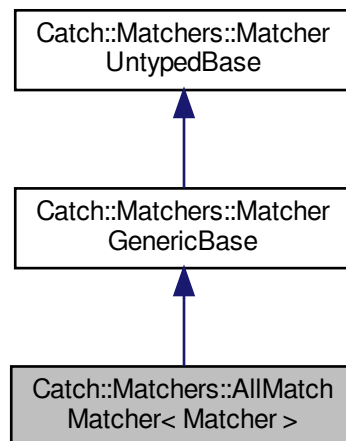
- const size_t **size** () const noexcept
- void **sample_n** (size_t n)
- void **sample** (epiworld_double n)

The documentation for this class was generated from the following file:

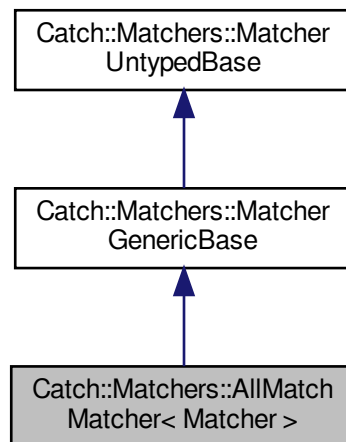
- include/epiworld/agents-bones.hpp

5.6 Catch::Matchers::AllMatchMatcher< Matcher > Class Template Reference

Inheritance diagram for Catch::Matchers::AllMatchMatcher< Matcher >:



Collaboration diagram for `Catch::Matchers::AllMatchMatcher< Matcher >`:



Public Member Functions

- **AllMatchMatcher** (Matcher matcher)
- `std::string describe ()` const override
- `template<typename RangeLike >`
`bool match (RangeLike &&rng)` const

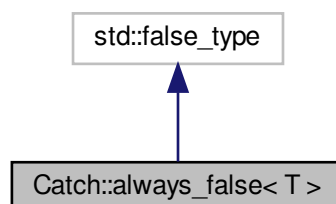
Additional Inherited Members

The documentation for this class was generated from the following file:

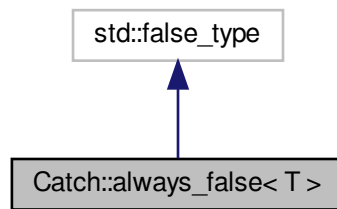
- `include/catch2/catch_amalgamated.hpp`

5.7 `Catch::always_false< T >` Struct Template Reference

Inheritance diagram for `Catch::always_false< T >`:



Collaboration diagram for Catch::always_false< T >:

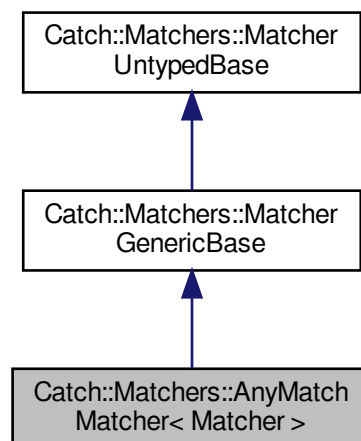


The documentation for this struct was generated from the following file:

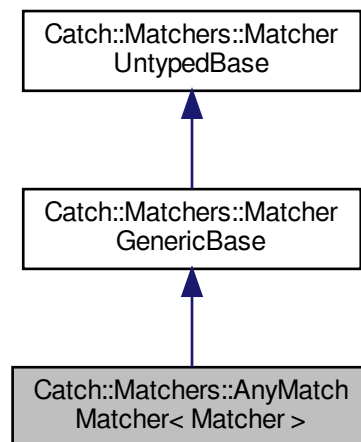
- [include/catch2/catch_amalgamated.hpp](#)

5.8 Catch::Matchers::AnyMatchMatcher< Matcher > Class Template Reference

Inheritance diagram for Catch::Matchers::AnyMatchMatcher< Matcher >:



Collaboration diagram for `Catch::Matchers::AnyMatchMatcher< Matcher >`:



Public Member Functions

- **AnyMatchMatcher** (Matcher matcher)
- `std::string describe ()` const override
- `template<typename RangeLike >`
`bool match (RangeLike &&rng)` const

Additional Inherited Members

The documentation for this class was generated from the following file:

- `include/catch2/catch_amalgamated.hpp`

5.9 Catch::Approx Class Reference

Public Member Functions

- **Approx** (double value)
- **Approx operator-** () const
- `template<typename T , typename = std::enable_if_t<std::is_constructible<double, T>::value>>`
Approx operator() (T const &value) const
- `template<typename T , typename = std::enable_if_t<std::is_constructible<double, T>::value>>`
Approx (T const &value)
- `template<typename T , typename = std::enable_if_t<std::is_constructible<double, T>::value>>`
Approx & epsilon (T const &newEpsilon)
- `template<typename T , typename = std::enable_if_t<std::is_constructible<double, T>::value>>`
Approx & margin (T const &newMargin)
- `template<typename T , typename = std::enable_if_t<std::is_constructible<double, T>::value>>`
Approx & scale (T const &newScale)
- `std::string toString ()` const

Static Public Member Functions

- static [Approx](#) **custom** ()

Friends

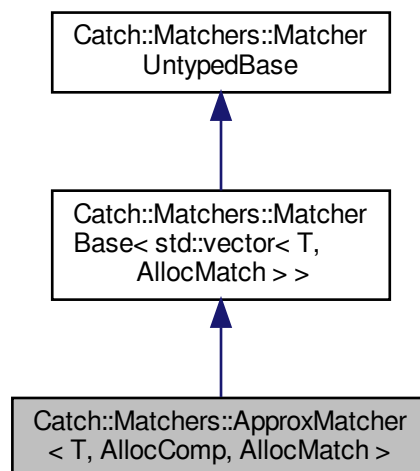
- template<typename T , typename = std::enable_if_t<std::is_constructible<double, T>::value>>
bool **operator==** (const T &lhs, [Approx](#) const &rhs)
- template<typename T , typename = std::enable_if_t<std::is_constructible<double, T>::value>>
bool **operator==** ([Approx](#) const &lhs, const T &rhs)
- template<typename T , typename = std::enable_if_t<std::is_constructible<double, T>::value>>
bool **operator!=** (T const &lhs, [Approx](#) const &rhs)
- template<typename T , typename = std::enable_if_t<std::is_constructible<double, T>::value>>
bool **operator!=** ([Approx](#) const &lhs, T const &rhs)
- template<typename T , typename = std::enable_if_t<std::is_constructible<double, T>::value>>
bool **operator<=** (T const &lhs, [Approx](#) const &rhs)
- template<typename T , typename = std::enable_if_t<std::is_constructible<double, T>::value>>
bool **operator<=** ([Approx](#) const &lhs, T const &rhs)
- template<typename T , typename = std::enable_if_t<std::is_constructible<double, T>::value>>
bool **operator>=** (T const &lhs, [Approx](#) const &rhs)
- template<typename T , typename = std::enable_if_t<std::is_constructible<double, T>::value>>
bool **operator>=** ([Approx](#) const &lhs, T const &rhs)

The documentation for this class was generated from the following file:

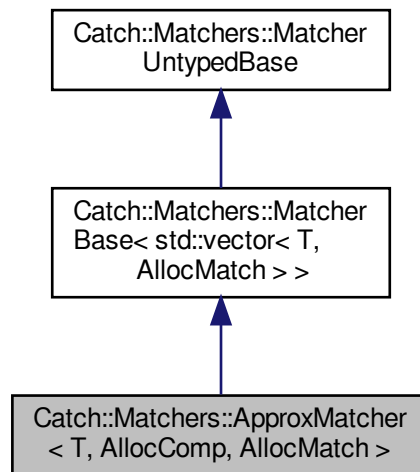
- include/catch2/[catch_amalgamated.hpp](#)

5.10 Catch::Matchers::ApproxMatcher< T, AllocComp, AllocMatch > Class Template Reference

Inheritance diagram for Catch::Matchers::ApproxMatcher< T, AllocComp, AllocMatch >:



Collaboration diagram for `Catch::Matchers::ApproxMatcher< T, AllocComp, AllocMatch >`:



Public Member Functions

- **ApproxMatcher** (`std::vector< T, AllocComp > const &comparator`)
- `bool match` (`std::vector< T, AllocMatch > const &v`) `const` override
- `std::string describe` () `const` override
- `template<typename = std::enable_if_t<std::is_constructible<double, T>::value>>`
`ApproxMatcher & epsilon` (`T const &newEpsilon`)
- `template<typename = std::enable_if_t<std::is_constructible<double, T>::value>>`
`ApproxMatcher & margin` (`T const &newMargin`)
- `template<typename = std::enable_if_t<std::is_constructible<double, T>::value>>`
`ApproxMatcher & scale` (`T const &newScale`)

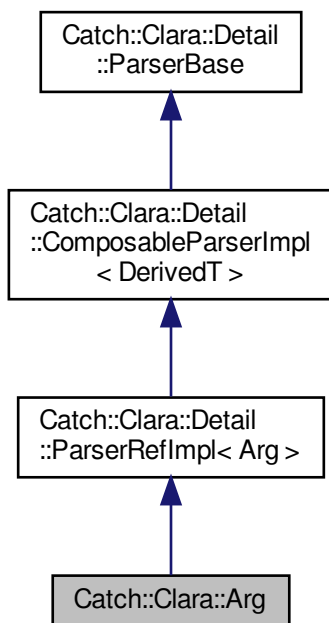
Additional Inherited Members

The documentation for this class was generated from the following file:

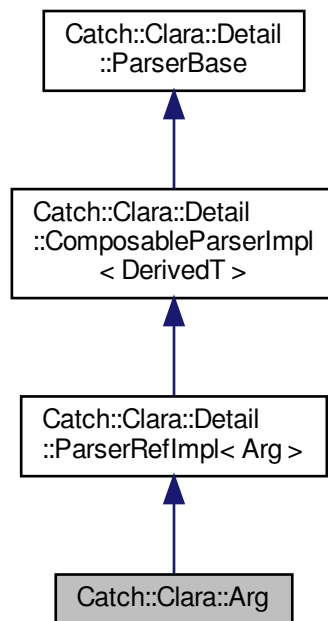
- `include/catch2/catch_amalgamated.hpp`

5.11 Catch::Clara::Arg Class Reference

Inheritance diagram for Catch::Clara::Arg:



Collaboration diagram for `Catch::Clara::Arg`:



Public Member Functions

- [Detail::InternalParseResult](#) **parse** (std::string const &, [Detail::TokenStream](#) const &tokens) const override

Additional Inherited Members

The documentation for this class was generated from the following file:

- include/catch2/[catch_amalgamated.hpp](#)

5.12 Catch::Clara::Args Class Reference

Public Member Functions

- **Args** (int argc, char const *const *argv)
- **Args** (std::initializer_list< std::string > args)
- std::string const & **exeName** () const

The documentation for this class was generated from the following file:

- include/catch2/[catch_amalgamated.hpp](#)

5.13 Catch::Generators::as< T > Struct Template Reference

The documentation for this struct was generated from the following file:

- include/catch2/catch_amalgamated.hpp

5.14 Catch::AssertionHandler Class Reference

Public Member Functions

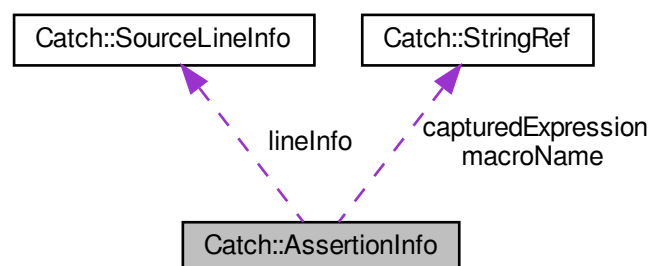
- **AssertionHandler** ([StringRef](#) macroName, [SourceLineInfo](#) const &lineInfo, [StringRef](#) capturedExpression, ResultDisposition::Flags resultDisposition)
- template<typename T >
void **handleExpr** ([ExprLhs](#)< T > const &expr)
- void **handleExpr** ([ITransientExpression](#) const &expr)
- void **handleMessage** (ResultWas::OfType resultType, [StringRef](#) message)
- void **handleExceptionThrownAsExpected** ()
- void **handleUnexpectedExceptionNotThrown** ()
- void **handleExceptionNotThrownAsExpected** ()
- void **handleThrowingCallSkipped** ()
- void **handleUnexpectedInflightException** ()
- void **complete** ()
- void **setCompleted** ()
- auto **allowThrows** () const -> bool

The documentation for this class was generated from the following file:

- include/catch2/catch_amalgamated.hpp

5.15 Catch::AssertionInfo Struct Reference

Collaboration diagram for Catch::AssertionInfo:



Public Attributes

- [StringRef](#) **macroName**
- [SourceLineInfo](#) **lineInfo**
- [StringRef](#) **capturedExpression**
- `ResultDisposition::Flags` **resultDisposition**

The documentation for this struct was generated from the following file:

- `include/catch2/catch_amalgamated.hpp`

5.16 `Catch::Detail::AssertionOrBenchmarkResult` Class Reference

Represents either an assertion or a benchmark result to be handled by cumulative reporter later.

```
#include <catch_amalgamated.hpp>
```

Public Member Functions

- **AssertionOrBenchmarkResult** ([AssertionStats](#) const &assertion)
- **AssertionOrBenchmarkResult** ([BenchmarkStats](#)<> const &benchmark)
- `bool isAssertion` () const
- `bool isBenchmark` () const
- [AssertionStats](#) const & **asAssertion** () const
- [BenchmarkStats](#) const & **asBenchmark** () const

5.16.1 Detailed Description

Represents either an assertion or a benchmark result to be handled by cumulative reporter later.

The documentation for this class was generated from the following file:

- `include/catch2/catch_amalgamated.hpp`

5.17 `Catch::AssertionReaction` Struct Reference

Public Attributes

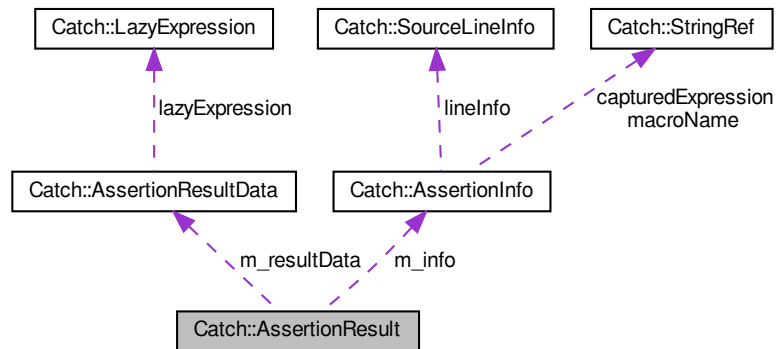
- `bool shouldDebugBreak` = false
- `bool shouldThrow` = false

The documentation for this struct was generated from the following file:

- `include/catch2/catch_amalgamated.hpp`

5.18 Catch::AssertionResult Class Reference

Collaboration diagram for Catch::AssertionResult:



Public Member Functions

- **AssertionResult** ([AssertionInfo](#) const &info, [AssertionResultData](#) const &data)
- bool **isOk** () const
- bool **succeeded** () const
- ResultWas::OfType **getResultType** () const
- bool **hasExpression** () const
- bool **hasMessage** () const
- std::string **getExpression** () const
- std::string **getExpressionInMacro** () const
- bool **hasExpandedExpression** () const
- std::string **getExpandedExpression** () const
- [StringRef](#) **getMessage** () const
- [SourceLineInfo](#) **getSourceInfo** () const
- [StringRef](#) **getTestMacroName** () const

Public Attributes

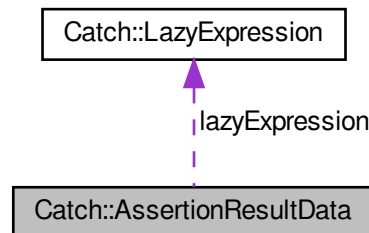
- [AssertionInfo](#) **m_info**
- [AssertionResultData](#) **m_resultData**

The documentation for this class was generated from the following file:

- include/catch2/catch_amalgamated.hpp

5.19 Catch::AssertionResultData Struct Reference

Collaboration diagram for Catch::AssertionResultData:



Public Member Functions

- **AssertionResultData** (ResultWas::OfType _resultType, [LazyExpression](#) const &_lazyExpression)
- std::string **reconstructExpression** () const

Public Attributes

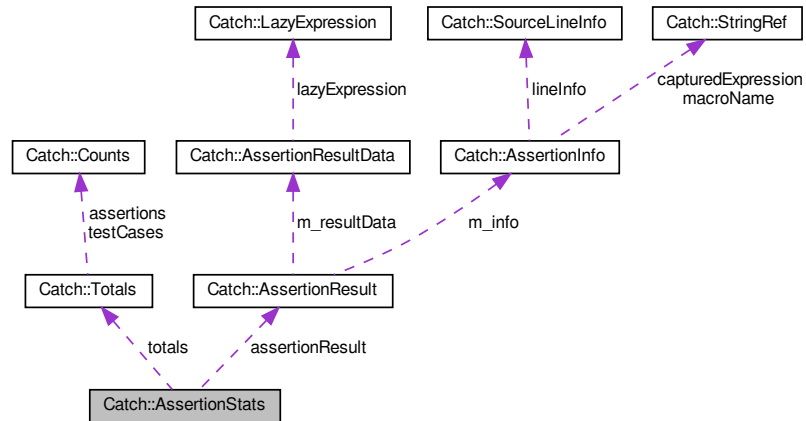
- std::string **message**
- std::string **reconstructedExpression**
- [LazyExpression](#) **lazyExpression**
- ResultWas::OfType **resultType**

The documentation for this struct was generated from the following file:

- include/catch2/[catch_amalgamated.hpp](#)

5.20 Catch::AssertionStats Struct Reference

Collaboration diagram for Catch::AssertionStats:



Public Member Functions

- **AssertionStats** ([AssertionResult](#) const &_assertionResult, std::vector< [MessageInfo](#) > const &_info← Messages, [Totals](#) const &_totals)
- **AssertionStats** ([AssertionStats](#) const &)=default
- **AssertionStats** ([AssertionStats](#) &&)=default
- [AssertionStats](#) & **operator=** ([AssertionStats](#) const &)=delete
- [AssertionStats](#) & **operator=** ([AssertionStats](#) &&)=delete

Public Attributes

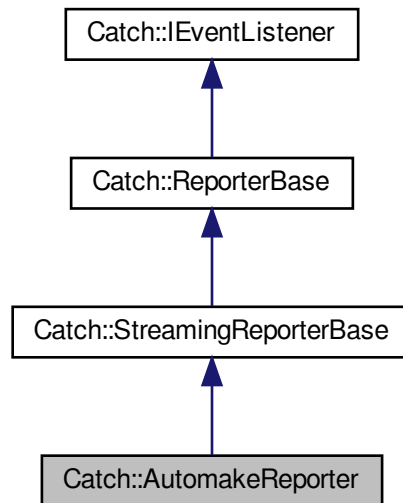
- [AssertionResult](#) **assertionResult**
- std::vector< [MessageInfo](#) > **infoMessages**
- [Totals](#) **totals**

The documentation for this struct was generated from the following file:

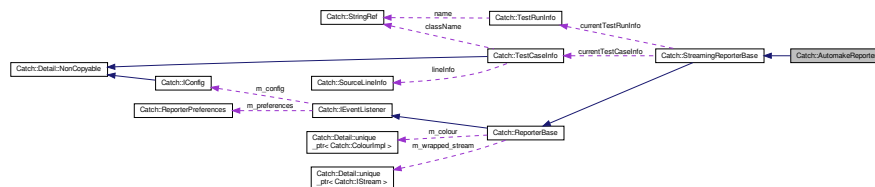
- include/catch2/[catch_amalgamated.hpp](#)

5.21 Catch::AutomakeReporter Class Reference

Inheritance diagram for Catch::AutomakeReporter:



Collaboration diagram for Catch::AutomakeReporter:



Public Member Functions

- void `testCaseEnded (TestCaseStats const &_testCaseStats)` override
Called once for each TEST_CASE, no matter how many times it is entered.
- void `skipTest (TestCaseInfo const &testInfo)` override
Called with test cases that are skipped due to the test run aborting.

Static Public Member Functions

- static std::string **getDescription** ()

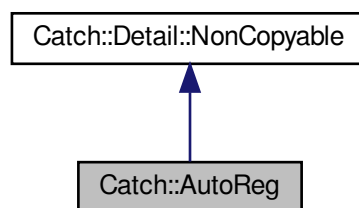
Additional Inherited Members

The documentation for this class was generated from the following file:

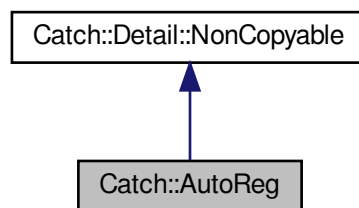
- include/catch2/[catch_amalgamated.hpp](#)

5.22 Catch::AutoReg Struct Reference

Inheritance diagram for Catch::AutoReg:



Collaboration diagram for Catch::AutoReg:



Public Member Functions

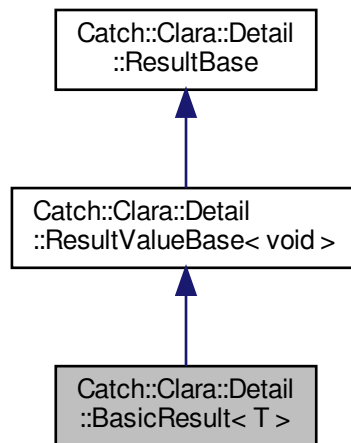
- **AutoReg** ([Detail::unique_ptr](#)< [ITestInvoker](#) > invoker, [SourceLineInfo](#) const &lineInfo, [StringRef](#) classOrMethod, [NameAndTags](#) const &nameAndTags) noexcept

The documentation for this struct was generated from the following file:

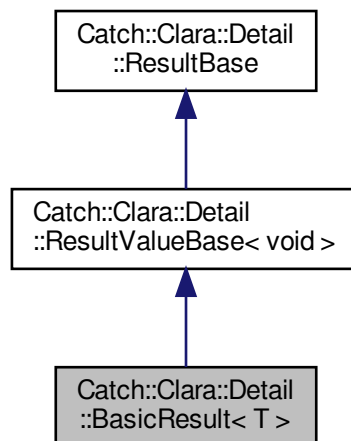
- include/catch2/[catch_amalgamated.hpp](#)

5.23 Catch::Clara::Detail::BasicResult< T > Class Template Reference

Inheritance diagram for Catch::Clara::Detail::BasicResult< T >:



Collaboration diagram for Catch::Clara::Detail::BasicResult< T >:



Public Member Functions

- `template<typename U >`
BasicResult ([BasicResult](#)< U > const &other)
- **operator bool** () const
- `auto type` () const -> [ResultType](#)
- `auto errorMessage` () const -> `std::string` const &

Static Public Member Functions

- `template<typename U >`
`static auto ok (U const &value) -> BasicResult`
- `static auto ok () -> BasicResult`
- `static auto logicError (std::string &&message) -> BasicResult`
- `static auto runtimeError (std::string &&message) -> BasicResult`

Protected Member Functions

- `void enforceOk () const override`
- `BasicResult (ResultType type, std::string &&message)`

Protected Attributes

- `std::string m_errorMessage`
- `ResultType m_type`

The documentation for this class was generated from the following file:

- `include/catch2/catch_amalgamated.hpp`

5.24 Catch::Benchmark::Benchmark Struct Reference

Public Member Functions

- `Benchmark (std::string &&benchmarkName)`
- `template<class FUN >`
`Benchmark (std::string &&benchmarkName, FUN &&func)`
- `template<typename Clock >`
`ExecutionPlan< FloatDuration< Clock > > prepare (const IConfig &cfg, Environment< FloatDuration< Clock >> env) const`
- `template<typename Clock = default_clock>`
`void run ()`
- `template<typename Fun , std::enable_if_t<!Detail::is_related< Fun, Benchmark >::value, int > = 0>`
`Benchmark & operator= (Fun func)`
- `operator bool ()`

The documentation for this struct was generated from the following file:

- `include/catch2/catch_amalgamated.hpp`

5.25 Catch::Benchmark::Detail::BenchmarkFunction Struct Reference

```
#include <catch_amalgamated.hpp>
```

Public Member Functions

- `template<typename Fun , std::enable_if_t<lis_related< Fun, BenchmarkFunction >::value, int > = 0>`
BenchmarkFunction (Fun &&fun)
- **BenchmarkFunction** ([BenchmarkFunction](#) &&that) noexcept
- **BenchmarkFunction** ([BenchmarkFunction](#) const &that)
- [BenchmarkFunction](#) & **operator=** ([BenchmarkFunction](#) &&that) noexcept
- [BenchmarkFunction](#) & **operator=** ([BenchmarkFunction](#) const &that)
- void **operator()** ([Chronometer](#) meter) const

5.25.1 Detailed Description

We need to reinvent `std::function` because every piece of code that might add overhead in a measurement context needs to have consistent performance characteristics so that we can account for it in the measurement. Implementations of `std::function` with optimizations that aren't always applicable, like small buffer optimizations, are not uncommon. This is effectively an implementation of `std::function` without any such optimizations; it may be slow, but it is consistently slow.

The documentation for this struct was generated from the following file:

- `include/catch2/catch_amalgamated.hpp`

5.26 Catch::BenchmarkInfo Struct Reference

Public Attributes

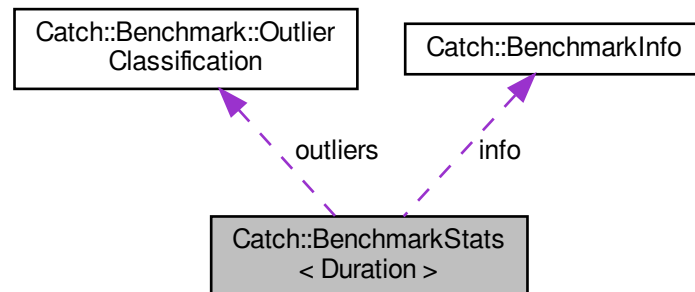
- `std::string` **name**
- `double` **estimatedDuration**
- `int` **iterations**
- `unsigned int` **samples**
- `unsigned int` **resamples**
- `double` **clockResolution**
- `double` **clockCost**

The documentation for this struct was generated from the following file:

- `include/catch2/catch_amalgamated.hpp`

5.27 Catch::BenchmarkStats< Duration > Struct Template Reference

Collaboration diagram for Catch::BenchmarkStats< Duration >:



Public Member Functions

- `template<typename Duration2 >`
`operator BenchmarkStats< Duration2 > () const`

Public Attributes

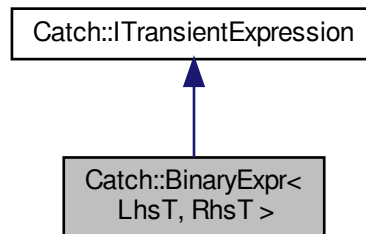
- [BenchmarkInfo](#) `info`
- `std::vector< Duration >` `samples`
- [Benchmark::Estimate](#)< Duration > `mean`
- [Benchmark::Estimate](#)< Duration > `standardDeviation`
- [Benchmark::OutlierClassification](#) `outliers`
- `double` `outlierVariance`

The documentation for this struct was generated from the following file:

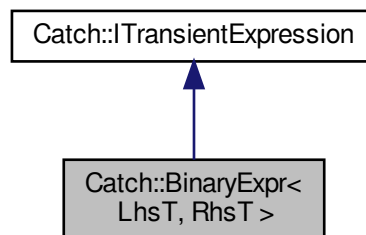
- `include/catch2/catch_amalgamated.hpp`

5.28 Catch::BinaryExpr< LhsT, RhsT > Class Template Reference

Inheritance diagram for Catch::BinaryExpr< LhsT, RhsT >:



Collaboration diagram for Catch::BinaryExpr< LhsT, RhsT >:



Public Member Functions

- **BinaryExpr** (bool comparisonResult, LhsT lhs, [StringRef](#) op, RhsT rhs)
- template<typename T >
auto **operator&&** (T) const -> [BinaryExpr](#)< LhsT, RhsT const & > const
- template<typename T >
auto **operator||** (T) const -> [BinaryExpr](#)< LhsT, RhsT const & > const
- template<typename T >
auto **operator==** (T) const -> [BinaryExpr](#)< LhsT, RhsT const & > const
- template<typename T >
auto **operator!=** (T) const -> [BinaryExpr](#)< LhsT, RhsT const & > const
- template<typename T >
auto **operator>** (T) const -> [BinaryExpr](#)< LhsT, RhsT const & > const
- template<typename T >
auto **operator<** (T) const -> [BinaryExpr](#)< LhsT, RhsT const & > const
- template<typename T >
auto **operator>=** (T) const -> [BinaryExpr](#)< LhsT, RhsT const & > const

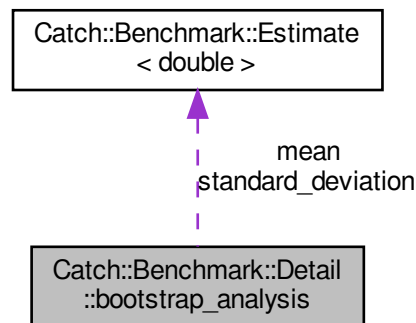
- `template<typename T >`
auto **operator**<= (T) const -> [BinaryExpr](#)< LhsT, RhsT const & > const

The documentation for this class was generated from the following file:

- `include/catch2/catch_amalgamated.hpp`

5.29 Catch::Benchmark::Detail::bootstrap_analysis Struct Reference

Collaboration diagram for Catch::Benchmark::Detail::bootstrap_analysis:



Public Attributes

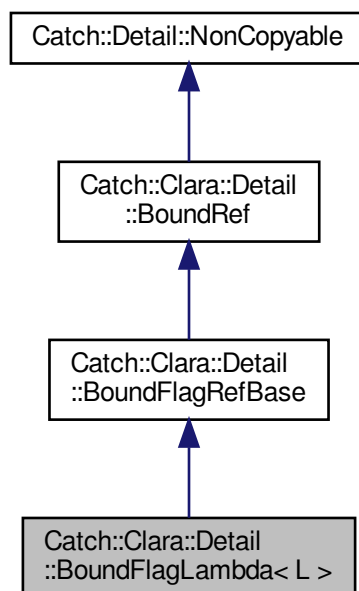
- [Estimate](#)< double > **mean**
- [Estimate](#)< double > **standard_deviation**
- double **outlier_variance**

The documentation for this struct was generated from the following file:

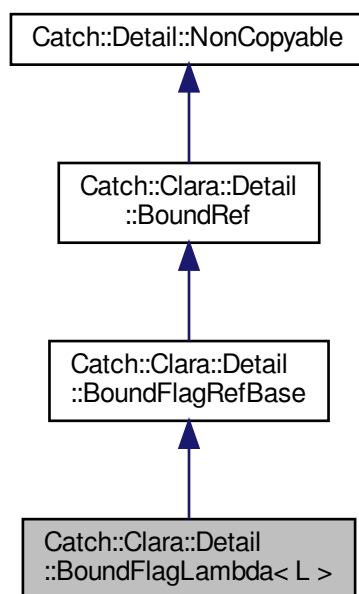
- `include/catch2/catch_amalgamated.hpp`

5.30 Catch::Clara::Detail::BoundFlagLambda< L > Struct Template Reference

Inheritance diagram for Catch::Clara::Detail::BoundFlagLambda< L >:



Collaboration diagram for Catch::Clara::Detail::BoundFlagLambda< L >:



Public Member Functions

- **BoundFlagLambda** (L const &lambda)
- auto **setFlag** (bool flag) -> [ParserResult](#) override

Public Attributes

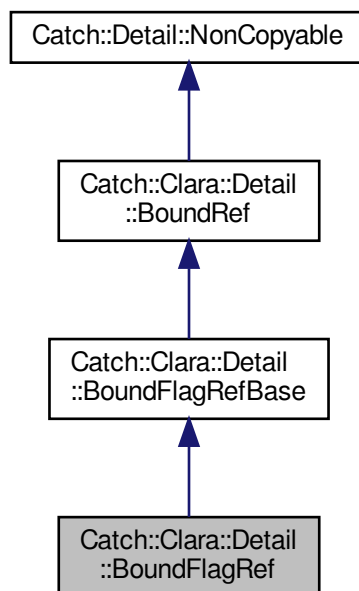
- L **m_lambda**

The documentation for this struct was generated from the following file:

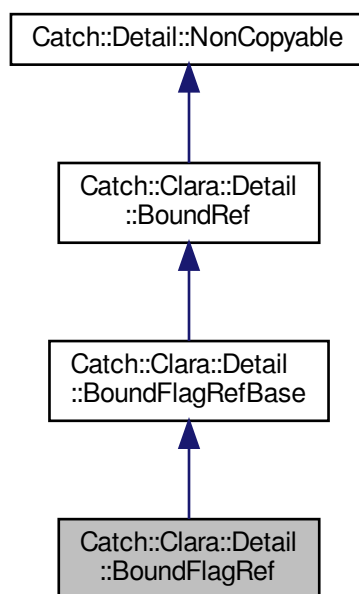
- include/catch2/[catch_amalgamated.hpp](#)

5.31 Catch::Clara::Detail::BoundFlagRef Struct Reference

Inheritance diagram for Catch::Clara::Detail::BoundFlagRef:



Collaboration diagram for Catch::Clara::Detail::BoundFlagRef:



Public Member Functions

- **BoundFlagRef** (bool &ref)
- [ParserResult](#) **setFlag** (bool flag) override

Public Attributes

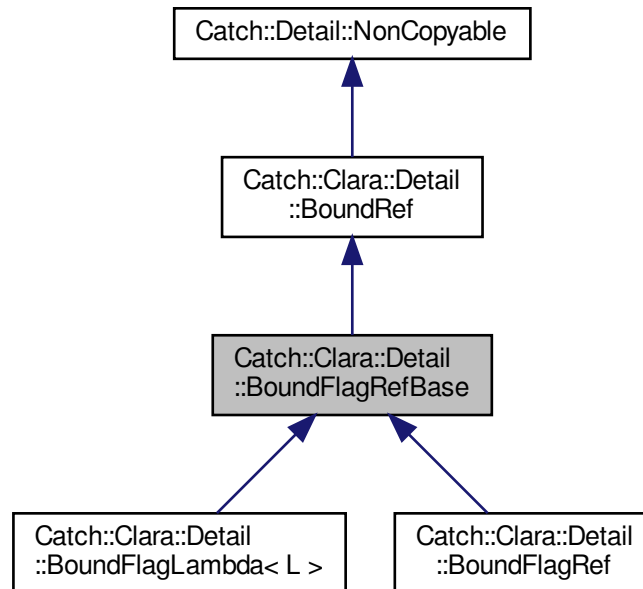
- bool & **m_ref**

The documentation for this struct was generated from the following file:

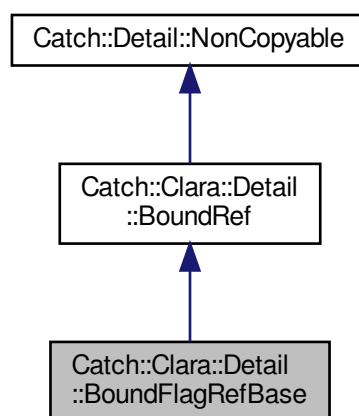
- include/catch2/[catch_amalgamated.hpp](#)

5.32 Catch::Clara::Detail::BoundFlagRefBase Struct Reference

Inheritance diagram for Catch::Clara::Detail::BoundFlagRefBase:



Collaboration diagram for Catch::Clara::Detail::BoundFlagRefBase:



Public Member Functions

- virtual auto **setFlag** (bool flag) -> [ParserResult](#)=0

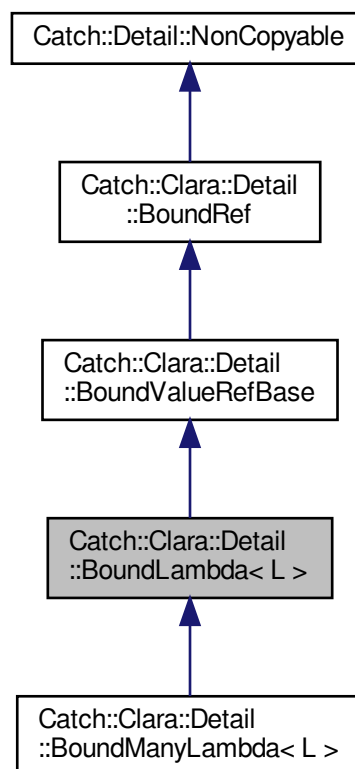
- bool **isFlag** () const override

The documentation for this struct was generated from the following file:

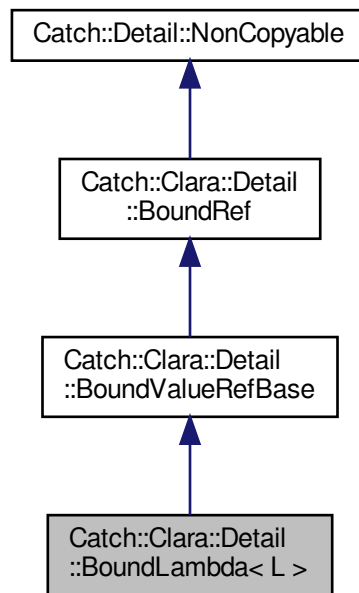
- include/catch2/[catch_amalgamated.hpp](#)

5.33 Catch::Clara::Detail::BoundLambda< L > Struct Template Reference

Inheritance diagram for Catch::Clara::Detail::BoundLambda< L >:



Collaboration diagram for `Catch::Clara::Detail::BoundLambda< L >`:



Public Member Functions

- **BoundLambda** (L const &lambda)
- auto **setValue** (std::string const &arg) -> [ParserResult](#) override

Public Attributes

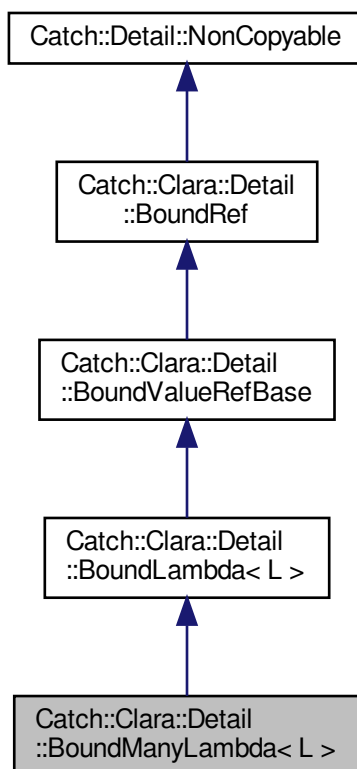
- L **m_lambda**

The documentation for this struct was generated from the following file:

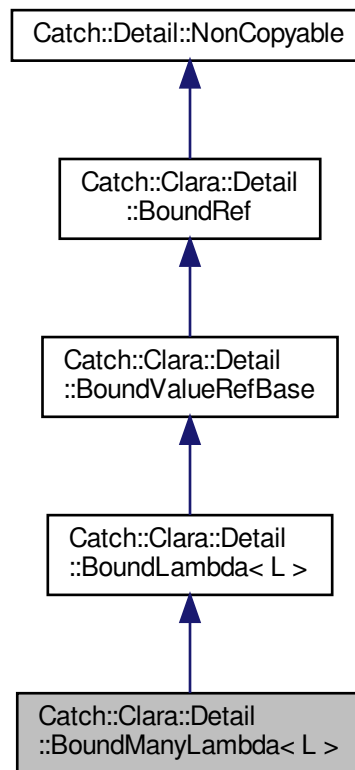
- include/catch2/[catch_amalgamated.hpp](#)

5.34 Catch::Clara::Detail::BoundManyLambda< L > Struct Template Reference

Inheritance diagram for Catch::Clara::Detail::BoundManyLambda< L >:



Collaboration diagram for `Catch::Clara::Detail::BoundManyLambda< L >`:



Public Member Functions

- **BoundManyLambda** (L const &lambda)
- **bool isContainer** () const override

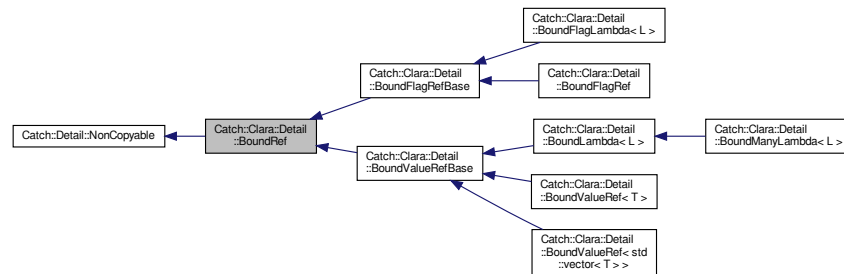
Additional Inherited Members

The documentation for this struct was generated from the following file:

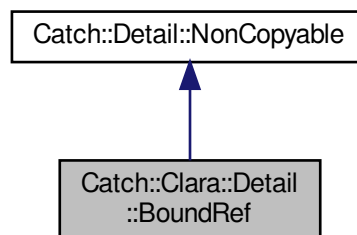
- `include/catch2/catch_amalgamated.hpp`

5.35 Catch::Clara::Detail::BoundRef Struct Reference

Inheritance diagram for Catch::Clara::Detail::BoundRef:



Collaboration diagram for Catch::Clara::Detail::BoundRef:



Public Member Functions

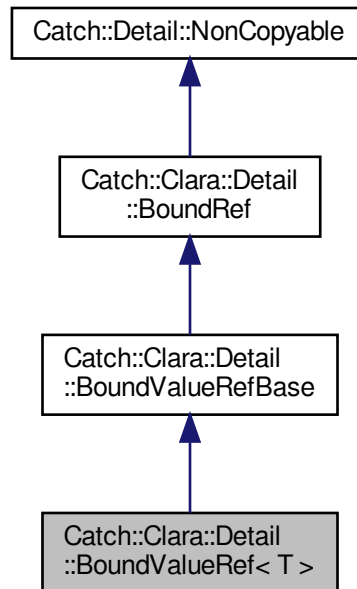
- virtual bool **isContainer** () const
- virtual bool **isFlag** () const

The documentation for this struct was generated from the following file:

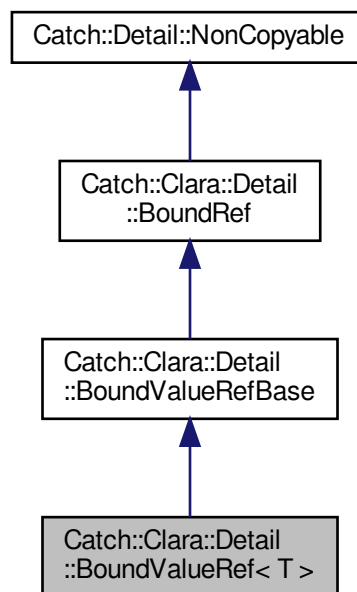
- include/catch2/[catch_amalgamated.hpp](#)

5.36 Catch::Clara::Detail::BoundValueRef< T > Struct Template Reference

Inheritance diagram for Catch::Clara::Detail::BoundValueRef< T >:



Collaboration diagram for Catch::Clara::Detail::BoundValueRef< T >:



Public Member Functions

- **BoundValueRef** (T &ref)
- [ParserResult](#) **setValue** (std::string const &arg) override

Public Attributes

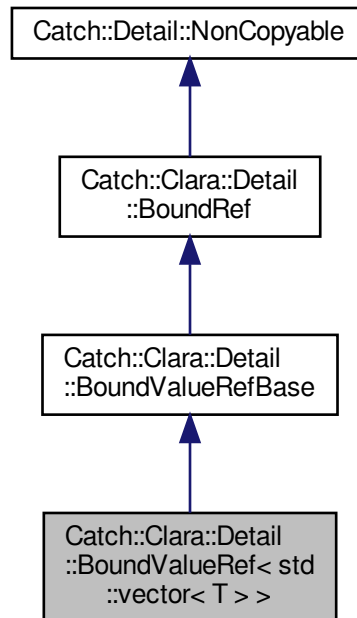
- T & m_ref

The documentation for this struct was generated from the following file:

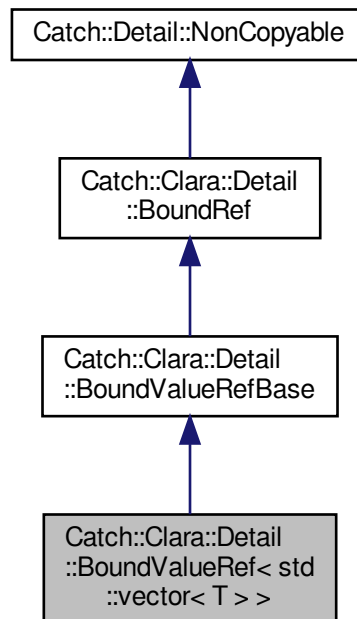
- include/catch2/[catch_amalgamated.hpp](#)

5.37 Catch::Clara::Detail::BoundValueRef< std::vector< T > > Struct Template Reference

Inheritance diagram for Catch::Clara::Detail::BoundValueRef< std::vector< T > >:



Collaboration diagram for Catch::Clara::Detail::BoundValueRef< std::vector< T > >:



Public Member Functions

- **BoundValueRef** (std::vector< T > &ref)
- auto **isContainer** () const -> bool override
- auto **setValue** (std::string const &arg) -> [ParserResult](#) override

Public Attributes

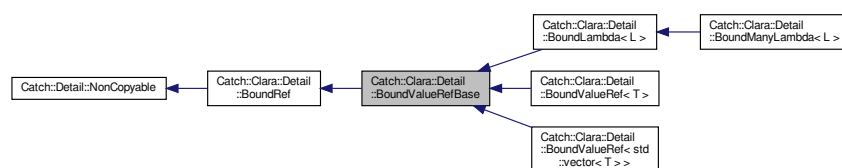
- std::vector< T > & **m_ref**

The documentation for this struct was generated from the following file:

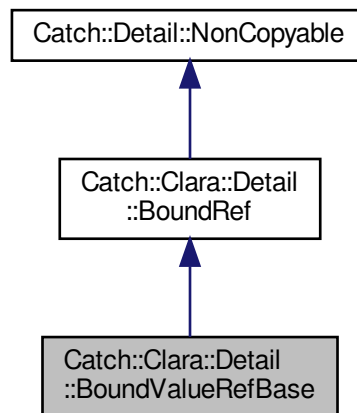
- include/catch2/[catch_amalgamated.hpp](#)

5.38 Catch::Clara::Detail::BoundValueRefBase Struct Reference

Inheritance diagram for Catch::Clara::Detail::BoundValueRefBase:



Collaboration diagram for `Catch::Clara::Detail::BoundValueRefBase`:



Public Member Functions

- virtual auto **setValue** (std::string const &arg) -> [ParserResult](#)=0

The documentation for this struct was generated from the following file:

- include/catch2/[catch_amalgamated.hpp](#)

5.39 Catch::Capturer Class Reference

Public Member Functions

- **Capturer** ([StringRef](#) macroName, [SourceLineInfo](#) const &lineInfo, ResultWas::OfType resultType, [StringRef](#) names)
- **Capturer** ([Capturer](#) const &)=delete
- [Capturer](#) & **operator=** ([Capturer](#) const &)=delete
- void **captureValue** (size_t index, std::string const &value)
- template<typename T >
void **captureValues** (size_t index, T const &value)
- template<typename T , typename... Ts>
void **captureValues** (size_t index, T const &value, Ts const &... values)

The documentation for this class was generated from the following file:

- include/catch2/[catch_amalgamated.hpp](#)

5.40 Catch::Matchers::CasedString Struct Reference

Public Member Functions

- **CasedString** (std::string const &str, CaseSensitive caseSensitivity)
- std::string **adjustString** (std::string const &str) const
- [StringRef](#) **caseSensitivitySuffix** () const

Public Attributes

- CaseSensitive **m_caseSensitivity**
- std::string **m_str**

The documentation for this struct was generated from the following file:

- include/catch2/[catch_amalgamated.hpp](#)

5.41 Catch::Detail::CaseInsensitiveEqualTo Struct Reference

Provides case-insensitive `op==` semantics when called.

```
#include <catch_amalgamated.hpp>
```

Public Member Functions

- bool **operator()** ([StringRef](#) lhs, [StringRef](#) rhs) const

5.41.1 Detailed Description

Provides case-insensitive `op==` semantics when called.

The documentation for this struct was generated from the following file:

- include/catch2/[catch_amalgamated.hpp](#)

5.42 Catch::Detail::CaseInsensitiveLess Struct Reference

Provides case-insensitive `op<` semantics when called.

```
#include <catch_amalgamated.hpp>
```

Public Member Functions

- bool **operator()** ([StringRef](#) lhs, [StringRef](#) rhs) const

5.42.1 Detailed Description

Provides case-insensitive `op<` semantics when called.

The documentation for this struct was generated from the following file:

- [include/catch2/catch_amalgamated.hpp](#)

5.43 `Catch_global_namespace_dummy` Struct Reference

The documentation for this struct was generated from the following file:

- [include/catch2/catch_amalgamated.hpp](#)

5.44 `Catch::Benchmark::Chronometer` Struct Reference

Public Member Functions

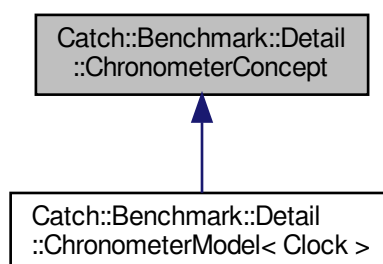
- `template<typename Fun >`
void **measure** (Fun &&fun)
- `int` **runs** () const
- **Chronometer** ([Detail::ChronometerConcept](#) &meter, int repeats_)

The documentation for this struct was generated from the following file:

- [include/catch2/catch_amalgamated.hpp](#)

5.45 `Catch::Benchmark::Detail::ChronometerConcept` Struct Reference

Inheritance diagram for `Catch::Benchmark::Detail::ChronometerConcept`:



Public Member Functions

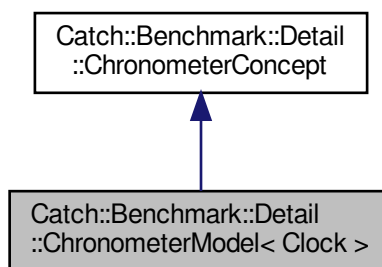
- virtual void **start** ()=0
- virtual void **finish** ()=0
- **ChronometerConcept** ([ChronometerConcept](#) const &)=default
- [ChronometerConcept](#) & **operator=** ([ChronometerConcept](#) const &)=default

The documentation for this struct was generated from the following file:

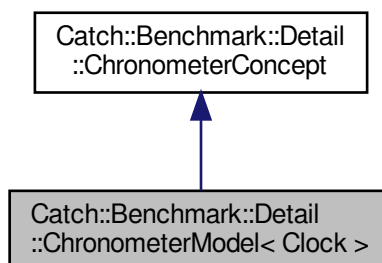
- include/catch2/[catch_amalgamated.hpp](#)

5.46 Catch::Benchmark::Detail::ChronometerModel< Clock > Struct Template Reference

Inheritance diagram for Catch::Benchmark::Detail::ChronometerModel< Clock >:



Collaboration diagram for Catch::Benchmark::Detail::ChronometerModel< Clock >:



Public Member Functions

- void **start** () override
- void **finish** () override
- ClockDuration< Clock > **elapsed** () const

Public Attributes

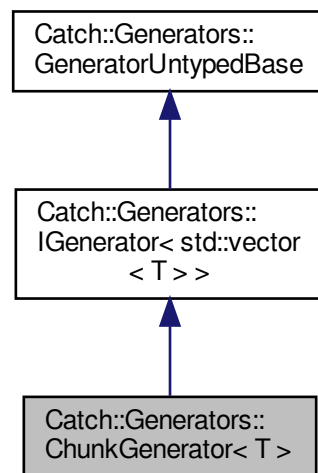
- TimePoint< Clock > **started**
- TimePoint< Clock > **finished**

The documentation for this struct was generated from the following file:

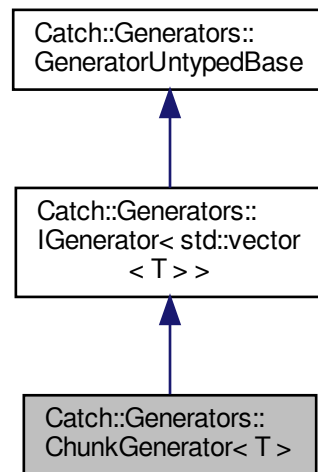
- include/catch2/[catch_amalgamated.hpp](#)

5.47 Catch::Generators::ChunkGenerator< T > Class Template Reference

Inheritance diagram for Catch::Generators::ChunkGenerator< T >:



Collaboration diagram for Catch::Generators::ChunkGenerator< T >:



Public Member Functions

- **ChunkGenerator** (size_t size, [GeneratorWrapper< T >](#) generator)
- std::vector< T > const & **get** () const override
- bool **next** () override

Additional Inherited Members

5.47.1 Member Function Documentation

5.47.1.1 next()

```
template<typename T >
bool Catch::Generators::ChunkGenerator< T >::next ( ) [inline], [override], [virtual]
```

Attempts to move the generator to the next element

Returns true iff the move succeeded (and a valid element can be retrieved).

Implements [Catch::Generators::GeneratorUntypedBase](#).

The documentation for this class was generated from the following file:

- include/catch2/[catch_amalgamated.hpp](#)

5.48 Catch::Colour Struct Reference

Public Types

- enum **Code** {
None = 0 , **White** , **Red** , **Green** ,
Blue , **Cyan** , **Yellow** , **Grey** ,
Bright = 0x10 , **BrightRed** = Bright | Red , **BrightGreen** = Bright | Green , **LightGrey** = Bright | Grey ,
BrightWhite = Bright | White , **BrightYellow** = Bright | Yellow , **FileName** = LightGrey , **Warning** = Bright↔
Yellow ,
ResultError = BrightRed , **ResultSuccess** = BrightGreen , **ResultExpectedFailure** = Warning , **Error** =
BrightRed ,
Success = Green , **OriginalExpression** = Cyan , **ReconstructedExpression** = BrightYellow , **Secondary**↔
Text = LightGrey ,
Headers = White }

The documentation for this struct was generated from the following file:

- include/catch2/[catch_amalgamated.hpp](#)

5.49 Catch::ColourImpl::ColourGuard Class Reference

```
#include <catch_amalgamated.hpp>
```

Public Member Functions

- [ColourGuard](#) (Colour::Code code, [ColourImpl](#) const *colour)
*Does **not** engage the guard/start the colour.*
- ColourGuard** ([ColourGuard](#) const &rhs)=delete
- [ColourGuard](#) & **operator=** ([ColourGuard](#) const &rhs)=delete
- ColourGuard** ([ColourGuard](#) &&rhs) noexcept
- [ColourGuard](#) & **operator=** ([ColourGuard](#) &&rhs) noexcept
- [~ColourGuard](#) ()
Removes colour if the guard was engaged.
- [ColourGuard](#) & **engage** (std::ostream &stream) &
- [ColourGuard](#) && **engage** (std::ostream &stream) &&

Friends

- std::ostream & **operator<<** (std::ostream &lhs, [ColourGuard](#) &guard)
Engages the guard and starts using colour.
- std::ostream & **operator<<** (std::ostream &lhs, [ColourGuard](#) &&guard)
Engages the guard and starts using colour.

5.49.1 Detailed Description

RAII wrapper around writing specific colour of text using specific colour impl into a stream.

5.49.2 Member Function Documentation

5.49.2.1 engage() [1/2]

```
ColourGuard& Catch::ColourImpl::ColourGuard::engage (
    std::ostream & stream ) &
```

Explicitly engages colour for given stream.

The API based on operator<< should be preferred.

5.49.2.2 engage() [2/2]

```
ColourGuard&& Catch::ColourImpl::ColourGuard::engage (
    std::ostream & stream ) &&
```

Explicitly engages colour for given stream.

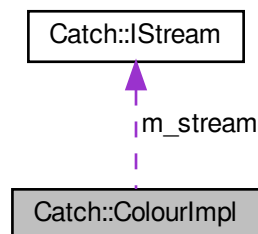
The API based on operator<< should be preferred.

The documentation for this class was generated from the following file:

- include/catch2/catch_amalgamated.hpp

5.50 Catch::ColourImpl Class Reference

Collaboration diagram for Catch::ColourImpl:



Classes

- class [ColourGuard](#)

Public Member Functions

- `ColourImpl` (`IStream *stream`)
- `ColourGuard guardColour` (`Colour::Code colourCode`)

Protected Attributes

- `IStream * m_stream`
The associated stream of this `ColourImpl` instance.

5.50.1 Member Function Documentation

5.50.1.1 guardColour()

```
ColourGuard Catch::ColourImpl::guardColour (
    Colour::Code colourCode )
```

Creates a guard object for given colour and this colour impl

Important: the guard starts disengaged, and has to be engaged explicitly.

The documentation for this class was generated from the following file:

- `include/catch2/catch_amalgamated.hpp`

5.51 Catch::TextFlow::Column Class Reference

```
#include <catch_amalgamated.hpp>
```

Classes

- class `const_iterator`

Public Types

- using `iterator` = `const_iterator`

Public Member Functions

- `Column` (`std::string const &text`)
- `Column & width` (`size_t newWidth`)
- `Column & indent` (`size_t newIndent`)
- `Column & initialIndent` (`size_t newIndent`)
- `size_t width` () const
- `const_iterator begin` () const
- `const_iterator end` () const
- `Columns operator+` (`Column const &other`)

Friends

- `std::ostream & operator<< (std::ostream &os, Column const &col)`

5.51.1 Detailed Description

Represents a column of text with specific width and indentation

When written out to a stream, it will perform linebreaking of the provided text so that the written lines fit within target width.

The documentation for this class was generated from the following file:

- `include/catch2/catch_amalgamated.hpp`

5.52 Catch::TextFlow::Columns Class Reference

Classes

- class [iterator](#)

Public Types

- using `const_iterator` = [iterator](#)

Public Member Functions

- [iterator](#) **begin** () const
- [iterator](#) **end** () const
- [Columns](#) & **operator+=** ([Column](#) const &col)
- [Columns](#) **operator+** ([Column](#) const &col)

Friends

- `std::ostream & operator<< (std::ostream &os, Columns const &cols)`

The documentation for this class was generated from the following file:

- `include/catch2/catch_amalgamated.hpp`

Additional Inherited Members

5.53.1 Member Function Documentation

5.53.1.1 testRunEnded()

```
void Catch::CompactReporter::testRunEnded (
    TestRunStats const & testRunStats ) [override], [virtual]
```

Called once after all tests in a testing run are finished

Not called if tests weren't run (e.g. only listings happened)

Reimplemented from [Catch::StreamingReporterBase](#).

5.53.1.2 testRunStarting()

```
void Catch::CompactReporter::testRunStarting (
    TestRunInfo const & testRunInfo ) [override], [virtual]
```

Called once in a testing run before tests are started

Not called if tests won't be run (e.g. only listing will happen)

Reimplemented from [Catch::StreamingReporterBase](#).

The documentation for this class was generated from the following file:

- include/catch2/[catch_amalgamated.hpp](#)

5.54 Catch::Benchmark::Detail::CompleterInvoker< Result > Struct Template Reference

Static Public Member Functions

- `template<typename Fun , typename... Args>`
static Result **invoke** (Fun &&fun, Args &&... args)

The documentation for this struct was generated from the following file:

- include/catch2/[catch_amalgamated.hpp](#)

5.55 **Catch::Benchmark::Detail::CompleteInvoker< void > Struct Reference**

Static Public Member Functions

- `template<typename Fun , typename... Args>`
`static CompleteType_t< void > invoke (Fun &&fun, Args &&... args)`

The documentation for this struct was generated from the following file:

- `include/catch2/catch_amalgamated.hpp`

5.56 **Catch::Benchmark::Detail::CompleteType< T > Struct Template Reference**

Public Types

- `using type = T`

The documentation for this struct was generated from the following file:

- `include/catch2/catch_amalgamated.hpp`

5.57 **Catch::Benchmark::Detail::CompleteType< void > Struct Reference**

Classes

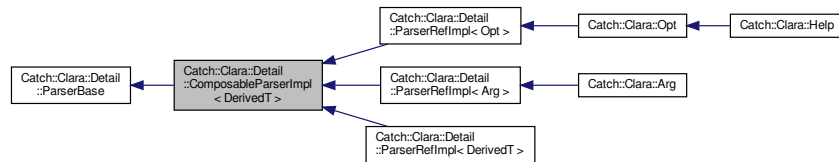
- struct `type`

The documentation for this struct was generated from the following file:

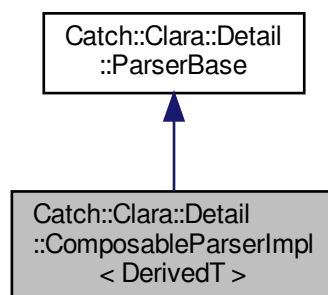
- `include/catch2/catch_amalgamated.hpp`

5.58 Catch::Clara::Detail::ComposableParserImpl< DerivedT > Class Template Reference

Inheritance diagram for Catch::Clara::Detail::ComposableParserImpl< DerivedT >:



Collaboration diagram for Catch::Clara::Detail::ComposableParserImpl< DerivedT >:



Public Member Functions

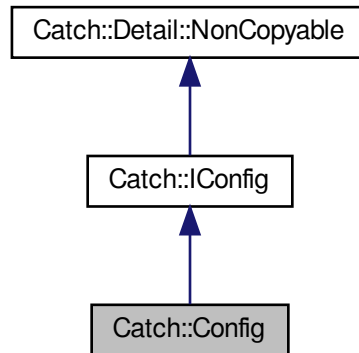
- `template<typename T >`
`auto operator| (T const &other) const -> Parser`
- `template<typename T >`
`Parser operator| (T const &other) const`

The documentation for this class was generated from the following file:

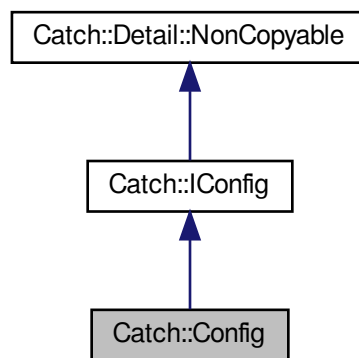
- `include/catch2/catch_amalgamated.hpp`

5.59 Catch::Config Class Reference

Inheritance diagram for Catch::Config:



Collaboration diagram for Catch::Config:



Public Member Functions

- **Config** ([ConfigData](#) const &data)
- bool **listTests** () const
- bool **listTags** () const
- bool **listReporters** () const
- bool **listListeners** () const
- std::vector< [ReporterSpec](#) > const & **getReporterSpecs** () const
- std::vector< [ProcessedReporterSpec](#) > const & **getProcessedReporterSpecs** () const

- `std::vector< std::string > const & getTestsOrTags ()` const override
- `std::vector< std::string > const & getSectionsToRun ()` const override
- `TestSpec const & testSpec ()` const override
- `bool hasTestFilters ()` const override
- `bool showHelp ()` const
- `bool allowThrows ()` const override
- `StringRef name ()` const override
- `bool includeSuccessfulResults ()` const override
- `bool warnAboutMissingAssertions ()` const override
- `bool warnAboutUnmatchedTestSpecs ()` const override
- `bool zeroTestsCountAsSuccess ()` const override
- `ShowDurations showDurations ()` const override
- `double minDuration ()` const override
- `TestRunOrder runOrder ()` const override
- `uint32_t rngSeed ()` const override
- `unsigned int shardCount ()` const override
- `unsigned int shardIndex ()` const override
- `ColourMode defaultColourMode ()` const override
- `bool shouldDebugBreak ()` const override
- `int abortAfter ()` const override
- `bool showInvisibles ()` const override
- `Verbosity verbosity ()` const override
- `bool skipBenchmarks ()` const override
- `bool benchmarkNoAnalysis ()` const override
- `unsigned int benchmarkSamples ()` const override
- `double benchmarkConfidenceInterval ()` const override
- `unsigned int benchmarkResamples ()` const override
- `std::chrono::milliseconds benchmarkWarmupTime ()` const override

The documentation for this class was generated from the following file:

- `include/catch2/catch_amalgamated.hpp`

5.60 Catch::ConfigData Struct Reference

Public Attributes

- `bool listTests = false`
- `bool listTags = false`
- `bool listReporters = false`
- `bool listListeners = false`
- `bool showSuccessfulTests = false`
- `bool shouldDebugBreak = false`
- `bool noThrow = false`
- `bool showHelp = false`
- `bool showInvisibles = false`
- `bool filenamesAsTags = false`
- `bool libIdentify = false`
- `bool allowZeroTests = false`
- `int abortAfter = -1`
- `uint32_t rngSeed = generateRandomSeed(GenerateFrom::Default)`

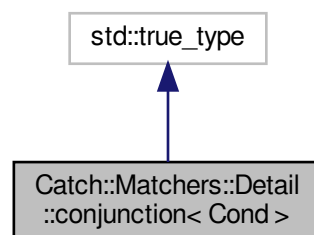
- unsigned int **shardCount** = 1
- unsigned int **shardIndex** = 0
- bool **skipBenchmarks** = false
- bool **benchmarkNoAnalysis** = false
- unsigned int **benchmarkSamples** = 100
- double **benchmarkConfidenceInterval** = 0.95
- unsigned int **benchmarkResamples** = 100000
- std::chrono::milliseconds::rep **benchmarkWarmupTime** = 100
- Verbosity **verbosity** = Verbosity::Normal
- WarnAbout::What **warnings** = WarnAbout::Nothing
- ShowDurations **showDurations** = ShowDurations::DefaultForReporter
- double **minDuration** = -1
- TestRunOrder **runOrder** = TestRunOrder::Declared
- ColourMode **defaultColourMode** = ColourMode::PlatformDefault
- WaitForKeypress::When **waitForKeypress** = WaitForKeypress::Never
- std::string **defaultOutputFilename**
- std::string **name**
- std::string **processName**
- std::vector< ReporterSpec > **reporterSpecifications**
- std::vector< std::string > **testsOrTags**
- std::vector< std::string > **sectionsToRun**

The documentation for this struct was generated from the following file:

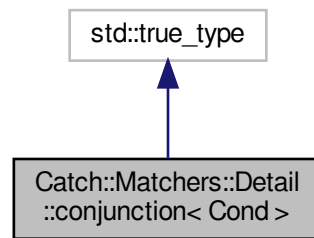
- include/catch2/catch_amalgamated.hpp

5.61 Catch::Matchers::Detail::conjunction< Cond > Struct Template Reference

Inheritance diagram for Catch::Matchers::Detail::conjunction< Cond >:



Collaboration diagram for Catch::Matchers::Detail::conjunction< Cond >:

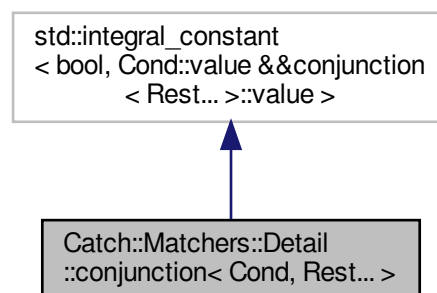


The documentation for this struct was generated from the following file:

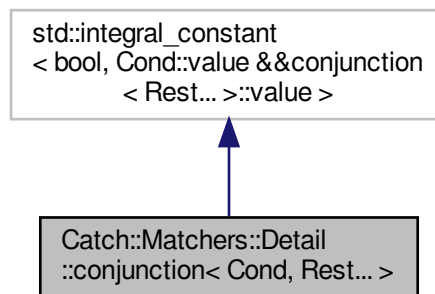
- [include/catch2/catch_amalgamated.hpp](#)

5.62 Catch::Matchers::Detail::conjunction< Cond, Rest... > Struct Template Reference

Inheritance diagram for Catch::Matchers::Detail::conjunction< Cond, Rest... >:



Collaboration diagram for `Catch::Matchers::Detail::conjunction< Cond, Rest... >`:

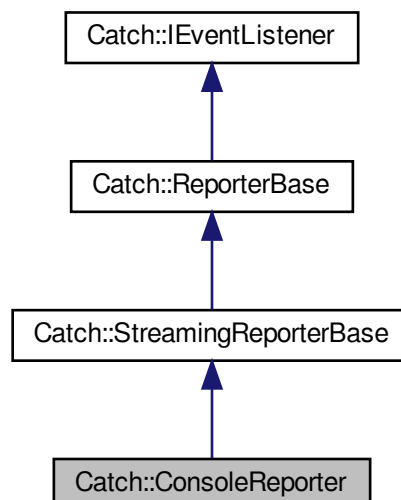


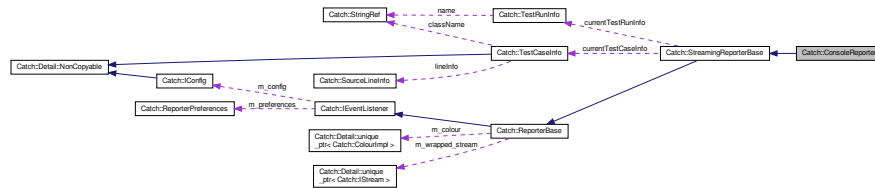
The documentation for this struct was generated from the following file:

- `include/catch2/catch_amalgamated.hpp`

5.63 Catch::ConsoleReporter Class Reference

Inheritance diagram for `Catch::ConsoleReporter`:





- **ConsoleReporter** (**ReporterConfig** &&config) override
Called when no test cases match provided test spec.
- void **noMatchingTestCases** (**StringRef** unmatchedSpec) override
Called for all invalid test specs from the cli.
- void **reportInvalidTestSpec** (**StringRef** arg) override
Called before assertion success/failure is evaluated.
- void **assertionStarting** (**AssertionInfo** const &) override
Called after assertion was fully evaluated.
- void **assertionEnded** (**AssertionStats** const &_assertionStats) override
Called when a SECTION is being entered. Not called for skipped sections.
- void **sectionStarting** (**SectionInfo** const &_sectionInfo) override
Called after a SECTION has finished running.
- void **sectionEnded** (**SectionStats** const &_sectionStats) override
Called after a SECTION has finished running.
- void **benchmarkPreparing** (**StringRef** name) override
Called when user-code is being probed before the actual benchmark runs.
- void **benchmarkStarting** (**BenchmarkInfo** const &info) override
Called after probe but before the user-code is being benchmarked.
- void **benchmarkEnded** (**BenchmarkStats**<> const &stats) override
Called with the benchmark results if benchmark successfully finishes.
- void **benchmarkFailed** (**StringRef** error) override
Called if running the benchmarks fails for any reason.
- void **testCaseEnded** (**TestCaseStats** const &_testCaseStats) override
Called once for each TEST_CASE, no matter how many times it is entered.
- void **testRunEnded** (**TestRunStats** const &_testRunStats) override
- void **testRunStarting** (**TestRunInfo** const &_testRunInfo) override

- static std::string **getDescription** ()

5.63.1 Member Function Documentation

5.63.1.1 testRunEnded()

```
void Catch::ConsoleReporter::testRunEnded (
    TestRunStats const & testRunStats ) [override], [virtual]
```

Called once after all tests in a testing run are finished

Not called if tests weren't run (e.g. only listings happened)

Reimplemented from [Catch::StreamingReporterBase](#).

5.63.1.2 testRunStarting()

```
void Catch::ConsoleReporter::testRunStarting (
    TestRunInfo const & testRunInfo ) [override], [virtual]
```

Called once in a testing run before tests are started

Not called if tests won't be run (e.g. only listing will happen)

Reimplemented from [Catch::StreamingReporterBase](#).

The documentation for this class was generated from the following file:

- [include/catch2/catch_amalgamated.hpp](#)

5.64 Catch::TextFlow::Column::const_iterator Class Reference

```
#include <catch_amalgamated.hpp>
```

Public Types

- using **difference_type** = std::ptrdiff_t
- using **value_type** = std::string
- using **pointer** = value_type *
- using **reference** = value_type &
- using **iterator_category** = std::forward_iterator_tag

Public Member Functions

- **const_iterator** ([Column](#) const &column)
- std::string **operator*** () const
- [const_iterator](#) & **operator++** ()
- [const_iterator](#) **operator++** (int)
- bool **operator==** ([const_iterator](#) const &other) const
- bool **operator!=** ([const_iterator](#) const &other) const

5.64.1 Detailed Description

Iterates "lines" in `Column` and return them

The documentation for this class was generated from the following file:

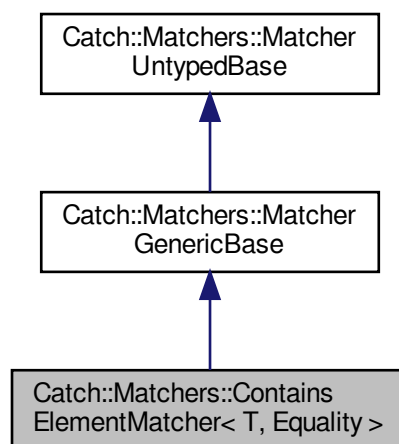
- `include/catch2/catch_amalgamated.hpp`

5.65 Catch::Matchers::ContainsElementMatcher< T, Equality > Class Template Reference

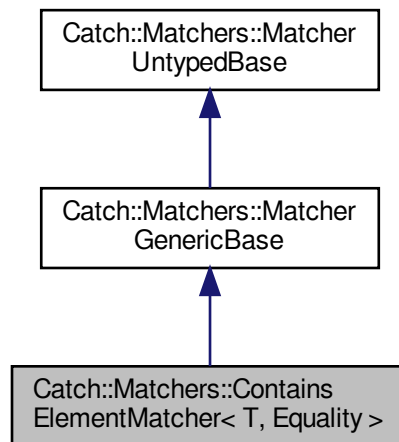
Matcher for checking that an element in range is equal to specific element.

```
#include <catch_amalgamated.hpp>
```

Inheritance diagram for `Catch::Matchers::ContainsElementMatcher< T, Equality >`:



Collaboration diagram for `Catch::Matchers::ContainsElementMatcher< T, Equality >`:



Public Member Functions

- `template<typename T2 , typename Equality2 >`
ContainsElementMatcher (T2 &&target, Equality2 &&predicate)
- `std::string describe ()` const override
- `template<typename RangeLike >`
bool match (RangeLike &&rng) const

Additional Inherited Members

5.65.1 Detailed Description

```
template<typename T, typename Equality>
class Catch::Matchers::ContainsElementMatcher< T, Equality >
```

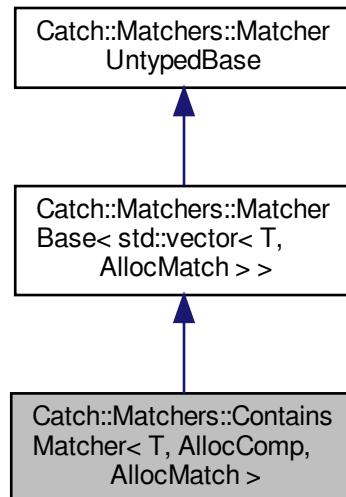
Matcher for checking that an element in range is equal to specific element.

The documentation for this class was generated from the following file:

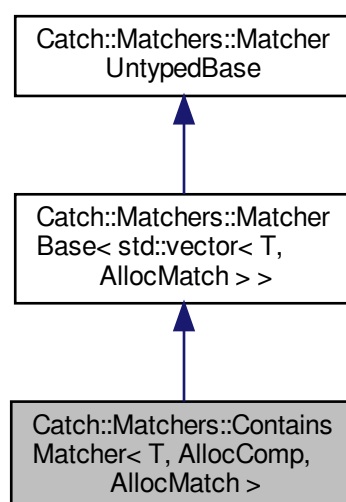
- `include/catch2/catch_amalgamated.hpp`

5.66 Catch::Matchers::ContainsMatcher< T, AllocComp, AllocMatch > Class Template Reference

Inheritance diagram for Catch::Matchers::ContainsMatcher< T, AllocComp, AllocMatch >:



Collaboration diagram for Catch::Matchers::ContainsMatcher< T, AllocComp, AllocMatch >:



Public Member Functions

- **ContainsMatcher** (std::vector< T, AllocComp > const &comparator)
- bool **match** (std::vector< T, AllocMatch > const &v) const override
- std::string **describe** () const override

Additional Inherited Members

The documentation for this class was generated from the following file:

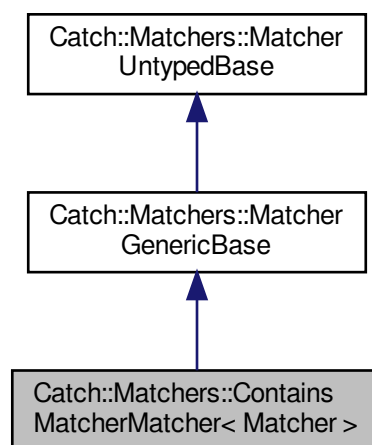
- include/catch2/[catch_amalgamated.hpp](#)

5.67 Catch::Matchers::ContainsMatcherMatcher< Matcher > Class Template Reference

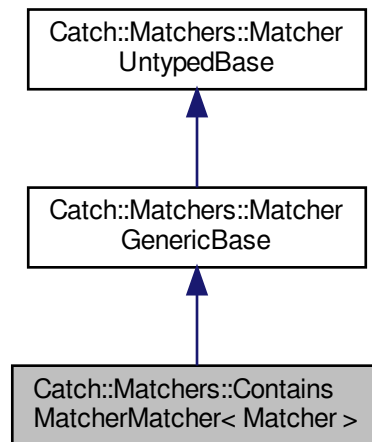
Meta-matcher for checking that an element in a range matches a specific matcher.

```
#include <catch_amalgamated.hpp>
```

Inheritance diagram for Catch::Matchers::ContainsMatcherMatcher< Matcher >:



Collaboration diagram for Catch::Matchers::ContainsMatcherMatcher< Matcher >:



Public Member Functions

- **ContainsMatcherMatcher** (Matcher matcher)
- template<typename RangeLike >
bool **match** (RangeLike &&rng) const
- std::string **describe** () const override

Additional Inherited Members

5.67.1 Detailed Description

```
template<typename Matcher>
class Catch::Matchers::ContainsMatcherMatcher< Matcher >
```

Meta-matcher for checking that an element in a range matches a specific matcher.

The documentation for this class was generated from the following file:

- include/catch2/[catch_amalgamated.hpp](#)

5.68 Catch::Counts Struct Reference

Public Member Functions

- [Counts](#) **operator-** ([Counts](#) const &other) const
- [Counts](#) & **operator+=** ([Counts](#) const &other)
- std::uint64_t **total** () const
- bool **allPassed** () const
- bool **allOk** () const

Public Attributes

- `std::uint64_t passed = 0`
- `std::uint64_t failed = 0`
- `std::uint64_t failedButOk = 0`

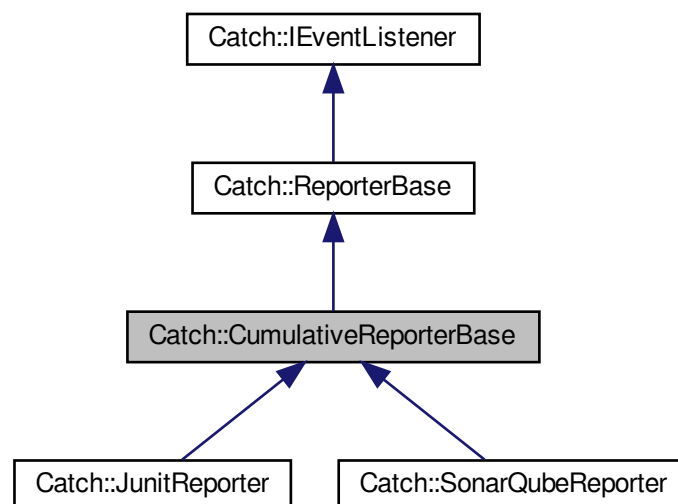
The documentation for this struct was generated from the following file:

- `include/catch2/catch_amalgamated.hpp`

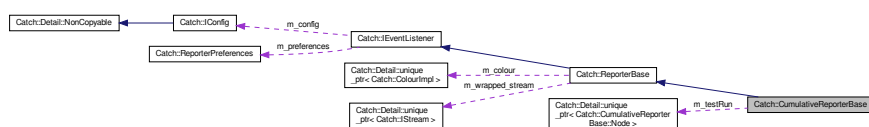
5.69 Catch::CumulativeReporterBase Class Reference

```
#include <catch_amalgamated.hpp>
```

Inheritance diagram for `Catch::CumulativeReporterBase`:



Collaboration diagram for `Catch::CumulativeReporterBase`:



Classes

- struct [Node](#)
- struct [SectionNode](#)

Public Types

- using **TestCaseNode** = [Node](#)< [TestCaseStats](#), [SectionNode](#) >
- using **TestRunNode** = [Node](#)< [TestRunStats](#), [TestCaseNode](#) >

Public Member Functions

- void [benchmarkPreparing](#) ([StringRef](#)) override
Called when user-code is being probed before the actual benchmark runs.
- void [benchmarkStarting](#) ([BenchmarkInfo](#) const &) override
Called after probe but before the user-code is being benchmarked.
- void [benchmarkEnded](#) ([BenchmarkStats](#)<> const &benchmarkStats) override
Called with the benchmark results if benchmark successfully finishes.
- void [benchmarkFailed](#) ([StringRef](#)) override
Called if running the benchmarks fails for any reason.
- void [noMatchingTestCases](#) ([StringRef](#)) override
Called when no test cases match provided test spec.
- void [reportInvalidTestSpec](#) ([StringRef](#)) override
Called for all invalid test specs from the cli.
- void [fatalErrorEncountered](#) ([StringRef](#)) override
Called if a fatal error (signal/structured exception) occurred.
- void [testRunStarting](#) ([TestRunInfo](#) const &) override
- void [testCaseStarting](#) ([TestCaseInfo](#) const &) override
Called once for each TEST_CASE, no matter how many times it is entered.
- void [testCasePartialStarting](#) ([TestCaseInfo](#) const &, uint64_t) override
Called every time a TEST_CASE is entered, including repeats (due to sections)
- void [sectionStarting](#) ([SectionInfo](#) const §ionInfo) override
Called when a SECTION is being entered. Not called for skipped sections.
- void [assertionStarting](#) ([AssertionInfo](#) const &) override
Called before assertion success/failure is evaluated.
- void [assertionEnded](#) ([AssertionStats](#) const &assertionStats) override
Called after assertion was fully evaluated.
- void [sectionEnded](#) ([SectionStats](#) const §ionStats) override
Called after a SECTION has finished running.
- void [testCasePartialEnded](#) ([TestCaseStats](#) const &, uint64_t) override
Called every time a TEST_CASE is entered, including repeats (due to sections)
- void [testCaseEnded](#) ([TestCaseStats](#) const &testCaseStats) override
Called once for each TEST_CASE, no matter how many times it is entered.
- void [testRunEnded](#) ([TestRunStats](#) const &testRunStats) override
- virtual void [testRunEndedCumulative](#) ()=0
Customization point: called after last test finishes (testRunEnded has been handled)
- void [skipTest](#) ([TestCaseInfo](#) const &) override
Called with test cases that are skipped due to the test run aborting.
- **ReporterBase** ([ReporterConfig](#) &&config)

Protected Attributes

- bool [m_shouldStoreSuccessfulAssertions](#) = true
Should the cumulative base store the assertion expansion for succesful assertions?
- bool [m_shouldStoreFailedAssertions](#) = true
Should the cumulative base store the assertion expansion for failed assertions?
- [Detail::unique_ptr](#)< [TestRunNode](#) > [m_testRun](#)
The root node of the test run tree.

5.69.1 Detailed Description

Utility base for reporters that need to handle all results at once

It stores tree of all test cases, sections and assertions, and after the test run is finished, calls into `testRunEndedCumulative` to pass the control to the deriving class.

If you are deriving from this class and override any testing related member functions, you should first call into the base's implementation to avoid breaking the tree construction.

Due to the way this base functions, it has to expand assertions up-front, even if they are later unused (e.g. because the deriving reporter does not report successful assertions, or because the deriving reporter does not use assertion expansion at all). Derived classes can use two customization points, `m_shouldStoreSuccessfulAssertions` and `m_shouldStoreFailedAssertions`, to disable the expansion and gain extra performance. **Accessing the assertion expansions if it wasn't stored is UB.**

5.69.2 Member Function Documentation

5.69.2.1 testRunEnded()

```
void Catch::CumulativeReporterBase::testRunEnded (
    TestRunStats const & testRunStats ) [override], [virtual]
```

Called once after all tests in a testing run are finished

Not called if tests weren't run (e.g. only listings happened)

Implements [Catch::IEventListener](#).

5.69.2.2 testRunStarting()

```
void Catch::CumulativeReporterBase::testRunStarting (
    TestRunInfo const & testRunInfo ) [inline], [override], [virtual]
```

Called once in a testing run before tests are started

Not called if tests won't be run (e.g. only listing will happen)

Implements [Catch::IEventListener](#).

Reimplemented in [Catch::SonarQubeReporter](#), and [Catch::JUnitReporter](#).

The documentation for this class was generated from the following file:

- [include/catch2/catch_amalgamated.hpp](#)

5.70 DataBase< TSeq > Class Template Reference

Statistical data about the process.

```
#include <database-bones.hpp>
```

Public Member Functions

- **DataBase** ([Model](#)< TSeq > &m)
- void **record_variant** ([Virus](#)< TSeq > &v)
Registering a new variant.
- void **record_tool** ([Tool](#)< TSeq > &t)
- void **set_seq_hasher** (std::function< std::vector< int >(TSeq)> fun)
- void **set_model** ([Model](#)< TSeq > &m)
- [Model](#)< TSeq > * **get_model** ()
- void **record** ()
- const std::vector< TSeq > & **get_sequence** () const
- const std::vector< int > & **get_nexposed** () const
- size_t **size** () const
- void **write_data** (std::string fn_variant_info, std::string fn_variant_hist, std::string fn_tool_info, std::string fn_tool_hist, std::string fn_total_hist, std::string fn_transmission, std::string fn_transition) const
- void **record_transmission** (int i, int j, int variant, int i_expo_date)
- size_t **get_n_variants** () const
- size_t **get_n_tools** () const
- void **reset** ()
- void **set_user_data** (std::vector< std::string > names)
- void **add_user_data** (std::vector< epiworld_double > x)
- void **add_user_data** (unsigned int j, epiworld_double x)
- [UserData](#)< TSeq > & **get_user_data** ()
- std::vector< epiworld_double > **transition_probability** (bool print=true) const
Calculates the transition probabilities.

Get recorded information from the model

Parameters

what	<i>std::string, The status, e.g., 0, 1, 2, ...</i>
------	--

Returns

In get_today_total, the current counts of what.

In get_today_variant, the current counts of what for each variant.

In get_hist_total, the time series of what

In get_hist_variant, the time series of what for each variant.

In get_hist_total_date and get_hist_variant_date the corresponding dates

- int **get_today_total** (std::string what) const
- int **get_today_total** (epiworld_fast_uint what) const
- void **get_today_total** (std::vector< std::string > *status=nullptr, std::vector< int > *counts=nullptr) const
- void **get_today_variant** (std::vector< std::string > &status, std::vector< int > &id, std::vector< int > &counts) const
- void **get_hist_total** (std::vector< int > *date, std::vector< std::string > *status, std::vector< int > *counts) const

- void **get_hist_variant** (std::vector< int > &date, std::vector< int > &id, std::vector< std::string > &status, std::vector< int > &counts) const
- MapVec_type< int, int > **reproductive_number** () const
Computes the reproductive number of each case.
- void **reproductive_number** (std::string fn) const

Friends

- class **Model**< TSeq >
- void **default_add_virus** (Action< TSeq > &a, Model< TSeq > *m)
- void **default_add_tool** (Action< TSeq > &a, Model< TSeq > *m)
- void **default_rm_virus** (Action< TSeq > &a, Model< TSeq > *m)
- void **default_rm_tool** (Action< TSeq > &a, Model< TSeq > *m)

5.70.1 Detailed Description

```
template<typename TSeq>
class DataBase< TSeq >
```

Statistical data about the process.

Template Parameters

<i>TSeq</i>	
-------------	--

5.70.2 Member Function Documentation

5.70.2.1 record_variant()

```
template<typename TSeq >
void DataBase< TSeq >::record_variant (
    Virus< TSeq > & v ) [inline]
```

Registering a new variant.

Parameters

<i>v</i>	Pointer to the new variant. Since variants are originated in the agent, the numbers simply move around. From the parent variant to the new variant. And the total number of infected does not change.
----------	---

5.70.2.2 reproductive_number()

```
template<typename TSeq >
MapVec_type< int, int > DataBase< TSeq >::reproductive_number [inline]
```

Computes the reproductive number of each case.

Parameters

<i>fn</i>	File where to write out the reproductive number.
-----------	--

5.70.2.3 transition_probability()

```
template<typename TSeq >
std::vector< epiworld_double > DataBase< TSeq >::transition_probability (
    bool print = true ) const [inline]
```

Calculates the transition probabilities.

Returns

std::vector< epiworld_double >

The documentation for this class was generated from the following files:

- include/epiworld/database-bones.hpp
- include/epiworld/database-meat.hpp

5.71 Catch::Decomposer Struct Reference

Friends

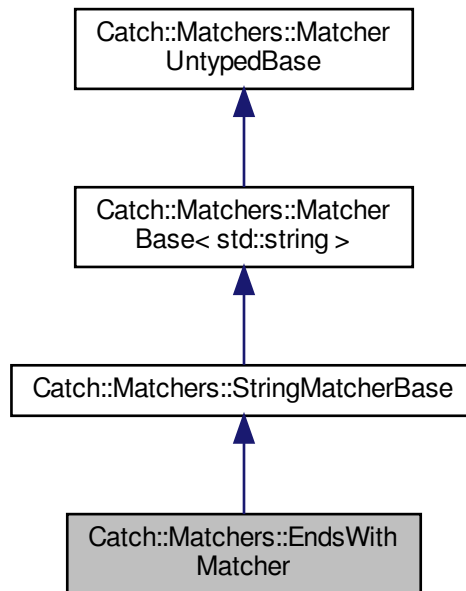
- template<typename T, std::enable_if_t<!std::is_arithmetic< std::remove_reference_t< T >>::value, int > = 0> auto **operator**<= (Decomposer &&, T &&lhs) -> ExprLhs< T const & >
- template<typename T, std::enable_if_t< std::is_arithmetic< T >::value, int > = 0> auto **operator**<= (Decomposer &&, T value) -> ExprLhs< T >

The documentation for this struct was generated from the following file:

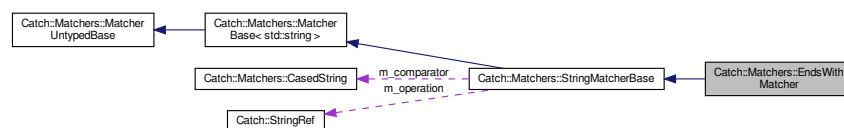
- include/catch2/catch_amalgamated.hpp

5.72 Catch::Matchers::EndsWithMatcher Class Reference

Inheritance diagram for Catch::Matchers::EndsWithMatcher:



Collaboration diagram for Catch::Matchers::EndsWithMatcher:



Public Member Functions

- **EndsWithMatcher** ([CasedString](#) const &comparator)
- **bool match** (std::string const &source) const override

Additional Inherited Members

The documentation for this class was generated from the following file:

- include/catch2/[catch_amalgamated.hpp](#)

5.73 Entity< TSeq > Class Template Reference

Public Member Functions

- void **add_agent** ([Agent](#)< TSeq > &p)
- void **add_agent** ([Agent](#)< TSeq > *p)
- void **rm_agent** (size_t idx)
- size_t **size** () const noexcept
- void **set_location** (std::vector< epiworld_double > loc)
- std::vector< epiworld_double > & **get_location** ()
- std::vector< [Agent](#)< TSeq > * >::iterator **begin** ()
- std::vector< [Agent](#)< TSeq > * >::iterator **end** ()
- std::vector< [Agent](#)< TSeq > * >::const_iterator **begin** () const
- std::vector< [Agent](#)< TSeq > * >::const_iterator **end** () const

Friends

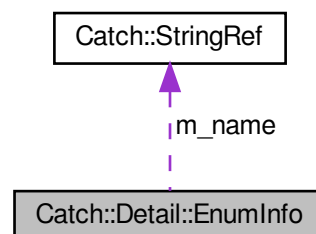
- class **Agent**< TSeq >
- class **Agents**< TSeq >
- class **Model**< TSeq >

The documentation for this class was generated from the following files:

- include/epiworld/agents-bones.hpp
- include/epiworld/entity-bones.hpp

5.74 Catch::Detail::EnumInfo Struct Reference

Collaboration diagram for Catch::Detail::EnumInfo:



Public Member Functions

- [StringRef](#) **lookup** (int value) const

Public Attributes

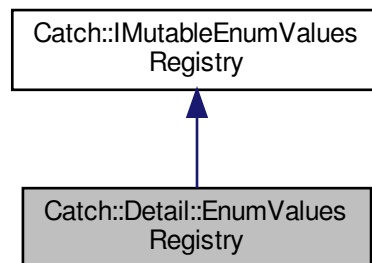
- [StringRef](#) **m_name**
- `std::vector< std::pair< int, StringRef > >` **m_values**

The documentation for this struct was generated from the following file:

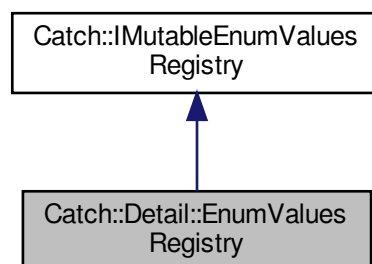
- `include/catch2/catch_amalgamated.hpp`

5.75 Catch::Detail::EnumValuesRegistry Class Reference

Inheritance diagram for Catch::Detail::EnumValuesRegistry:



Collaboration diagram for Catch::Detail::EnumValuesRegistry:



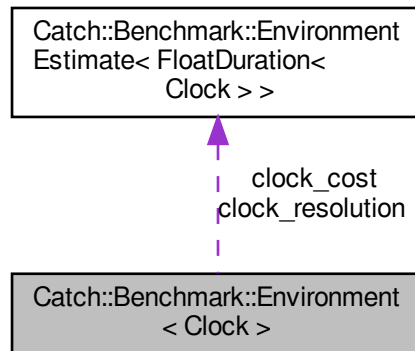
Additional Inherited Members

The documentation for this class was generated from the following file:

- `include/catch2/catch_amalgamated.hpp`

5.76 Catch::Benchmark::Environment< Clock > Struct Template Reference

Collaboration diagram for Catch::Benchmark::Environment< Clock >:



Public Types

- using `clock_type` = `Clock`

Public Attributes

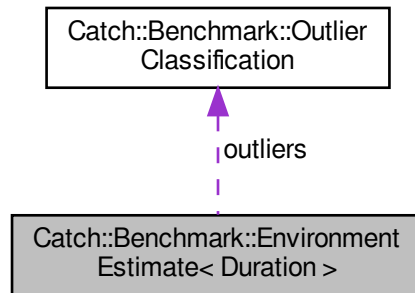
- `EnvironmentEstimate< FloatDuration< Clock > >` `clock_resolution`
- `EnvironmentEstimate< FloatDuration< Clock > >` `clock_cost`

The documentation for this struct was generated from the following file:

- `include/catch2/catch_amalgamated.hpp`

5.77 Catch::Benchmark::EnvironmentEstimate< Duration > Struct Template Reference

Collaboration diagram for Catch::Benchmark::EnvironmentEstimate< Duration >:



Public Member Functions

- `template<typename Duration2 >`
`operator EnvironmentEstimate< Duration2 > () const`

Public Attributes

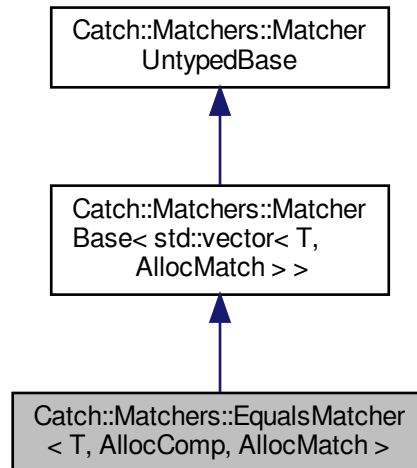
- `Duration` **mean**
- `OutlierClassification` **outliers**

The documentation for this struct was generated from the following file:

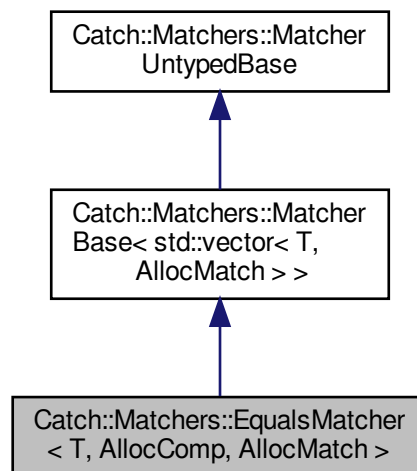
- `include/catch2/catch_amalgamated.hpp`

5.78 Catch::Matchers::EqualsMatcher< T, AllocComp, AllocMatch > Class Template Reference

Inheritance diagram for Catch::Matchers::EqualsMatcher< T, AllocComp, AllocMatch >:



Collaboration diagram for Catch::Matchers::EqualsMatcher< T, AllocComp, AllocMatch >:



Public Member Functions

- **EqualsMatcher** (std::vector< T, AllocComp > const &comparator)

- bool **match** (std::vector< T, AllocMatch > const &v) const override
- std::string **describe** () const override

Additional Inherited Members

The documentation for this class was generated from the following file:

- include/catch2/[catch_amalgamated.hpp](#)

5.79 Catch::ErrnoGuard Class Reference

```
#include <catch_amalgamated.hpp>
```

5.79.1 Detailed Description

Simple RAI class that stores the value of `errno` at construction and restores it at destruction.

The documentation for this class was generated from the following file:

- include/catch2/[catch_amalgamated.hpp](#)

5.80 Catch::Benchmark::Estimate< Duration > Struct Template Reference

Public Member Functions

- template<typename Duration2 >
operator Estimate< **Duration2** > () const

Public Attributes

- Duration **point**
- Duration **lower_bound**
- Duration **upper_bound**
- double **confidence_interval**

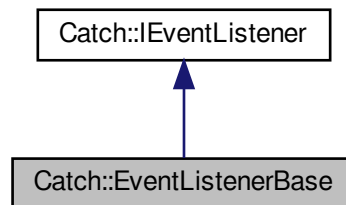
The documentation for this struct was generated from the following file:

- include/catch2/[catch_amalgamated.hpp](#)

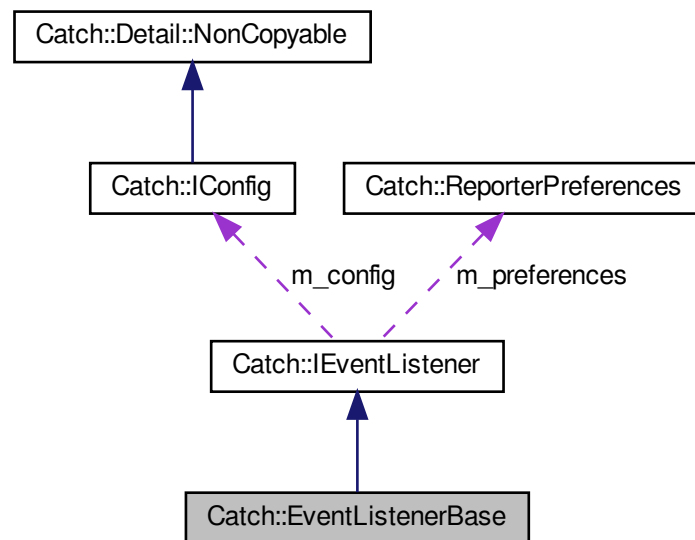
5.81 Catch::EventListenerBase Class Reference

```
#include <catch_amalgamated.hpp>
```

Inheritance diagram for Catch::EventListenerBase:



Collaboration diagram for Catch::EventListenerBase:



Public Member Functions

- void [reportInvalidTestSpec](#) ([StringRef](#) unmatchedSpec) override
Called for all invalid test specs from the cli.
- void [fatalErrorEncountered](#) ([StringRef](#) error) override
Called if a fatal error (signal/structured exception) occurred.

- void [benchmarkPreparing](#) ([StringRef](#) name) override
Called when user-code is being probed before the actual benchmark runs.
- void [benchmarkStarting](#) ([BenchmarkInfo](#) const &benchmarkInfo) override
Called after probe but before the user-code is being benchmarked.
- void [benchmarkEnded](#) ([BenchmarkStats](#)<> const &benchmarkStats) override
Called with the benchmark results if benchmark successfully finishes.
- void [benchmarkFailed](#) ([StringRef](#) error) override
Called if running the benchmarks fails for any reason.
- void [assertionStarting](#) ([AssertionInfo](#) const &assertionInfo) override
Called before assertion success/failure is evaluated.
- void [assertionEnded](#) ([AssertionStats](#) const &assertionStats) override
Called after assertion was fully evaluated.
- void [listReporters](#) (std::vector< [ReporterDescription](#) > const &descriptions) override
Writes out information about provided reporters using reporter-specific format.
- void [listListeners](#) (std::vector< [ListenerDescription](#) > const &descriptions) override
Writes out the provided listeners descriptions using reporter-specific format.
- void [listTests](#) (std::vector< [TestCaseHandle](#) > const &tests) override
Writes out information about provided tests using reporter-specific format.
- void [listTags](#) (std::vector< [TagInfo](#) > const &tagInfos) override
Writes out information about the provided tags using reporter-specific format.
- void [noMatchingTestCases](#) ([StringRef](#) unmatchedSpec) override
Called when no test cases match provided test spec.
- void [testRunStarting](#) ([TestRunInfo](#) const &testRunInfo) override
- void [testCaseStarting](#) ([TestCaseInfo](#) const &testInfo) override
Called once for each TEST_CASE, no matter how many times it is entered.
- void [testCasePartialStarting](#) ([TestCaseInfo](#) const &testInfo, uint64_t partNumber) override
Called every time a TEST_CASE is entered, including repeats (due to sections)
- void [sectionStarting](#) ([SectionInfo](#) const §ionInfo) override
Called when a SECTION is being entered. Not called for skipped sections.
- void [sectionEnded](#) ([SectionStats](#) const §ionStats) override
Called after a SECTION has finished running.
- void [testCasePartialEnded](#) ([TestCaseStats](#) const &testCaseStats, uint64_t partNumber) override
Called every time a TEST_CASE is entered, including repeats (due to sections)
- void [testCaseEnded](#) ([TestCaseStats](#) const &testCaseStats) override
Called once for each TEST_CASE, no matter how many times it is entered.
- void [testRunEnded](#) ([TestRunStats](#) const &testRunStats) override
- void [skipTest](#) ([TestCaseInfo](#) const &testInfo) override
Called with test cases that are skipped due to the test run aborting.
- [IEventListener](#) ([IConfig](#) const *config)

Additional Inherited Members

5.81.1 Detailed Description

Base class to simplify implementing listeners.

Provides empty default implementation for all [IEventListener](#) member functions, so that a listener implementation can pick which member functions it actually cares about.

5.81.2 Member Function Documentation

5.81.2.1 testRunEnded()

```
void Catch::EventListenerBase::testRunEnded (
    TestRunStats const & testRunStats ) [override], [virtual]
```

Called once after all tests in a testing run are finished

Not called if tests weren't run (e.g. only listings happened)

Implements [Catch::IEventListener](#).

5.81.2.2 testRunStarting()

```
void Catch::EventListenerBase::testRunStarting (
    TestRunInfo const & testRunInfo ) [override], [virtual]
```

Called once in a testing run before tests are started

Not called if tests won't be run (e.g. only listing will happen)

Implements [Catch::IEventListener](#).

The documentation for this class was generated from the following file:

- [include/catch2/catch_amalgamated.hpp](#)

5.82 Catch::EventListenerFactory Class Reference

Public Member Functions

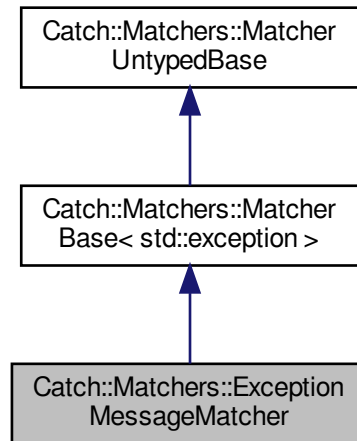
- virtual [IEventListenerPtr](#) **create** ([IConfig](#) const *config) const =0
- virtual [StringRef](#) **getName** () const =0
Return a meaningful name for the listener, e.g. its type name.
- virtual std::string **getDescription** () const =0
Return listener's description if available.

The documentation for this class was generated from the following file:

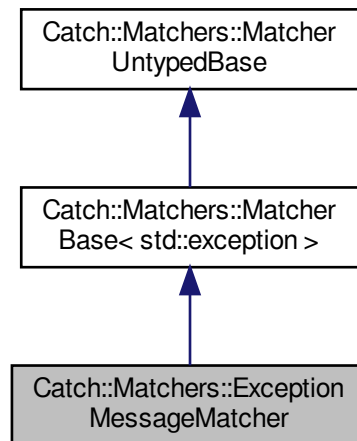
- [include/catch2/catch_amalgamated.hpp](#)

5.83 Catch::Matchers::ExceptionMessageMatcher Class Reference

Inheritance diagram for Catch::Matchers::ExceptionMessageMatcher:



Collaboration diagram for Catch::Matchers::ExceptionMessageMatcher:



Public Member Functions

- **ExceptionMessageMatcher** (std::string const &message)
- bool **match** (std::exception const &ex) const override
- std::string **describe** () const override

Additional Inherited Members

The documentation for this class was generated from the following file:

- include/catch2/[catch_amalgamated.hpp](#)

5.84 Catch::ExceptionTranslatorRegistrar Class Reference

Public Member Functions

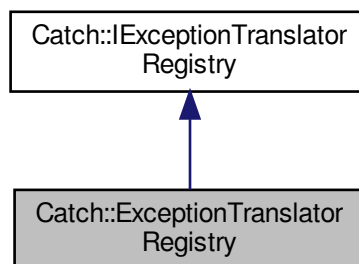
- `template<typename T >`
ExceptionTranslatorRegistrar (std::string(*translateFunction)(T const &))

The documentation for this class was generated from the following file:

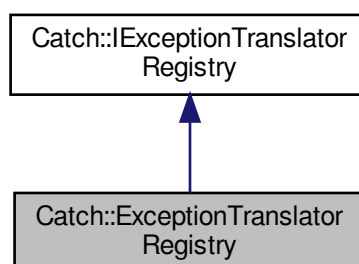
- include/catch2/[catch_amalgamated.hpp](#)

5.85 Catch::ExceptionTranslatorRegistry Class Reference

Inheritance diagram for Catch::ExceptionTranslatorRegistry:



Collaboration diagram for Catch::ExceptionTranslatorRegistry:



Public Member Functions

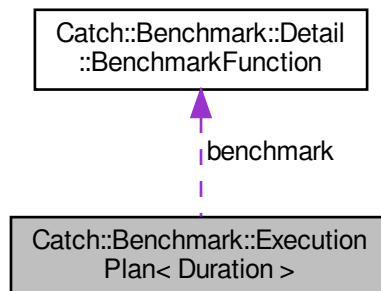
- void **registerTranslator** ([Detail::unique_ptr](#)< [IExceptionTranslator](#) > &&translator)
- std::string **translateActiveException** () const override
- std::string **tryTranslators** () const

The documentation for this class was generated from the following file:

- include/catch2/[catch_amalgamated.hpp](#)

5.86 Catch::Benchmark::ExecutionPlan< Duration > Struct Template Reference

Collaboration diagram for Catch::Benchmark::ExecutionPlan< Duration >:



Public Member Functions

- template<typename Duration2 >
operator ExecutionPlan< **Duration2** > () const
- template<typename Clock >
std::vector< FloatDuration< Clock > > **run** (const [IConfig](#) &cfg, [Environment](#)< FloatDuration< Clock > > env) const

Public Attributes

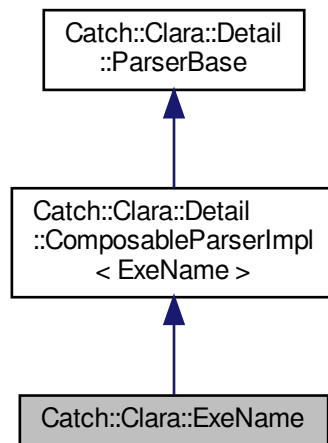
- int **iterations_per_sample**
- Duration **estimated_duration**
- [Detail::BenchmarkFunction](#) **benchmark**
- Duration **warmup_time**
- int **warmup_iterations**

The documentation for this struct was generated from the following file:

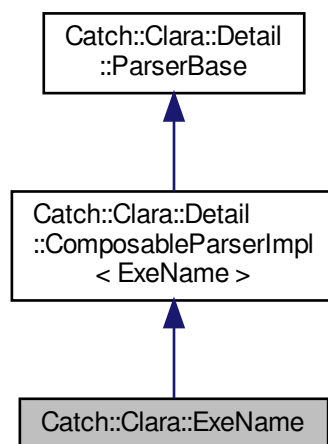
- include/catch2/[catch_amalgamated.hpp](#)

5.87 Catch::Clara::ExeName Class Reference

Inheritance diagram for Catch::Clara::ExeName:



Collaboration diagram for Catch::Clara::ExeName:



Public Member Functions

- **ExeName** (std::string &ref)
- template<typename LambdaT >
ExeName (LambdaT const &lambda)

- [Detail::InternalParseResult](#) **parse** (std::string const &, [Detail::TokenStream](#) const &tokens) const override
- std::string const & **name** () const
- [Detail::ParserResult](#) **set** (std::string const &newName)

The documentation for this class was generated from the following file:

- include/catch2/catch_amalgamated.hpp

5.88 Catch::ExprLhs< LhsT > Class Template Reference

Public Member Functions

- **ExprLhs** (LhsT lhs)
- auto **makeUnaryExpr** () const -> [UnaryExpr](#)< LhsT >

Friends

- template<typename RhsT, std::enable_if_t<!std::is_arithmetic< std::remove_reference_t< RhsT >>::value, int > = 0>
auto **operator==** ([ExprLhs](#) &&lhs, RhsT &&rhs) -> [BinaryExpr](#)< LhsT, RhsT const & >
- template<typename RhsT, std::enable_if_t< std::is_arithmetic< RhsT >::value, int > = 0>
auto **operator==** ([ExprLhs](#) &&lhs, RhsT rhs) -> [BinaryExpr](#)< LhsT, RhsT >
- template<typename RhsT, std::enable_if_t<!std::is_arithmetic< std::remove_reference_t< RhsT >>::value, int > = 0>
auto **operator!=** ([ExprLhs](#) &&lhs, RhsT &&rhs) -> [BinaryExpr](#)< LhsT, RhsT const & >
- template<typename RhsT, std::enable_if_t< std::is_arithmetic< RhsT >::value, int > = 0>
auto **operator!=** ([ExprLhs](#) &&lhs, RhsT rhs) -> [BinaryExpr](#)< LhsT, RhsT >
- template<typename RhsT >
auto **operator&&** ([ExprLhs](#) &&, RhsT &&) -> [BinaryExpr](#)< LhsT, RhsT const & >
- template<typename RhsT >
auto **operator||** ([ExprLhs](#) &&, RhsT &&) -> [BinaryExpr](#)< LhsT, RhsT const & >

The documentation for this class was generated from the following file:

- include/catch2/catch_amalgamated.hpp

5.89 Catch::Clara::Detail::fake_arg Struct Reference

Public Member Functions

- template<typename T >
operator T ()

The documentation for this struct was generated from the following file:

- include/catch2/catch_amalgamated.hpp

5.90 `Catch::FatalConditionHandler` Class Reference

```
#include <catch_amalgamated.hpp>
```

Public Member Functions

- void **engage** ()
- void **disengage** () noexcept

5.90.1 Detailed Description

Wrapper for platform-specific fatal error (signals/SEH) handlers

Tries to be cooperative with other handlers, and not step over other handlers. This means that unknown structured exceptions are passed on, previous signal handlers are called, and so on.

Can only be instantiated once, and assumes that once a signal is caught, the binary will end up terminating. Thus, there

The documentation for this class was generated from the following file:

- include/catch2/[catch_amalgamated.hpp](#)

5.91 `Catch::FatalConditionHandlerGuard` Class Reference

Simple RAII guard for (dis)engaging the [FatalConditionHandler](#).

```
#include <catch_amalgamated.hpp>
```

Public Member Functions

- **FatalConditionHandlerGuard** ([FatalConditionHandler](#) *handler)

5.91.1 Detailed Description

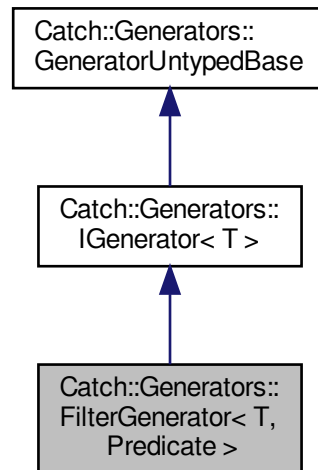
Simple RAII guard for (dis)engaging the [FatalConditionHandler](#).

The documentation for this class was generated from the following file:

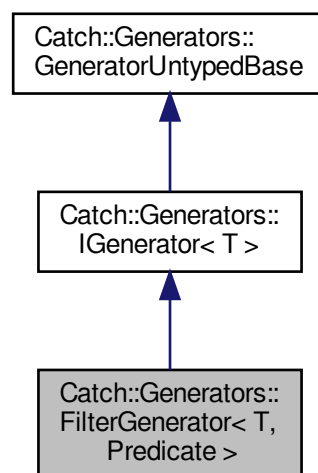
- include/catch2/[catch_amalgamated.hpp](#)

5.92 Catch::Generators::FilterGenerator< T, Predicate > Class Template Reference

Inheritance diagram for Catch::Generators::FilterGenerator< T, Predicate >:



Collaboration diagram for Catch::Generators::FilterGenerator< T, Predicate >:



Public Member Functions

- `template<typename P = Predicate>`
FilterGenerator (P &&pred, [GeneratorWrapper](#)< T > &&generator)

- T const & **get** () const override
- bool **next** () override

Additional Inherited Members

5.92.1 Member Function Documentation

5.92.1.1 next()

```
template<typename T , typename Predicate >  
bool Catch::Generators::FilterGenerator< T, Predicate >::next ( ) [inline], [override], [virtual]
```

Attempts to move the generator to the next element

Returns true iff the move succeeded (and a valid element can be retrieved).

Implements [Catch::Generators::GeneratorUntypedBase](#).

The documentation for this class was generated from the following file:

- include/catch2/[catch_amalgamated.hpp](#)

5.93 Catch::TestSpec::FilterMatch Struct Reference

Public Attributes

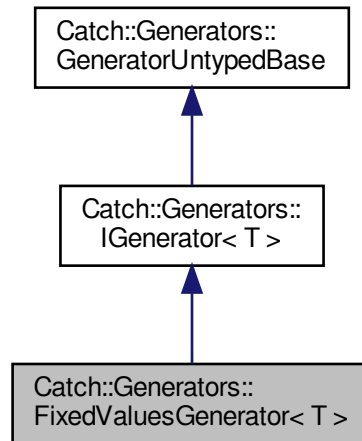
- std::string **name**
- std::vector< [TestCaseHandle](#) const * > **tests**

The documentation for this struct was generated from the following file:

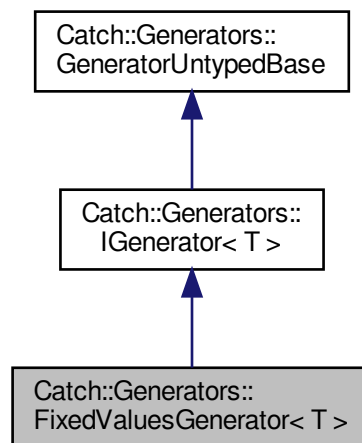
- include/catch2/[catch_amalgamated.hpp](#)

5.94 Catch::Generators::FixedValuesGenerator< T > Class Template Reference

Inheritance diagram for Catch::Generators::FixedValuesGenerator< T >:



Collaboration diagram for Catch::Generators::FixedValuesGenerator< T >:



Public Member Functions

- **FixedValuesGenerator** (std::initializer_list< T > values)
- T const & **get** () const override
- bool **next** () override

Additional Inherited Members

5.94.1 Member Function Documentation

5.94.1.1 next()

```
template<typename T >  
bool Catch::Generators::FixedValuesGenerator< T >::next ( ) [inline], [override], [virtual]
```

Attempts to move the generator to the next element

Returns true iff the move succeeded (and a valid element can be retrieved).

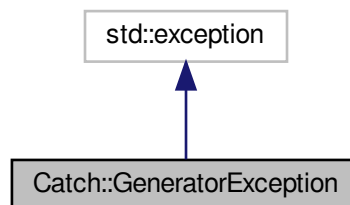
Implements [Catch::Generators::GeneratorUntypedBase](#).

The documentation for this class was generated from the following file:

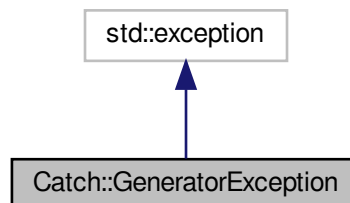
- include/catch2/catch_amalgamated.hpp

5.95 Catch::GeneratorException Class Reference

Inheritance diagram for Catch::GeneratorException:



Collaboration diagram for Catch::GeneratorException:



Public Member Functions

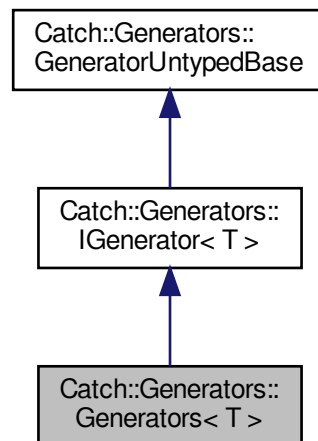
- **GeneratorException** (const char *msg)
- const char * **what** () const noexcept override final

The documentation for this class was generated from the following file:

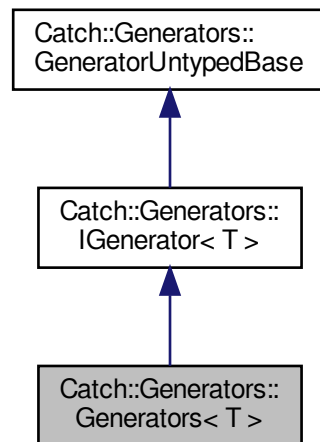
- include/catch2/[catch_amalgamated.hpp](#)

5.96 Catch::Generators::Generators< T > Class Template Reference

Inheritance diagram for Catch::Generators::Generators< T >:



Collaboration diagram for Catch::Generators::Generators< T >:



Public Member Functions

- `template<typename... Gs>`
Generators (Gs &&... moreGenerators)
- `T const & get ()` const override
- `bool next ()` override

Additional Inherited Members

5.96.1 Member Function Documentation

5.96.1.1 next()

```

template<typename T >
bool Catch::Generators::Generators< T >::next ( ) [inline], [override], [virtual]

```

Attempts to move the generator to the next element

Returns true iff the move succeeded (and a valid element can be retrieved).

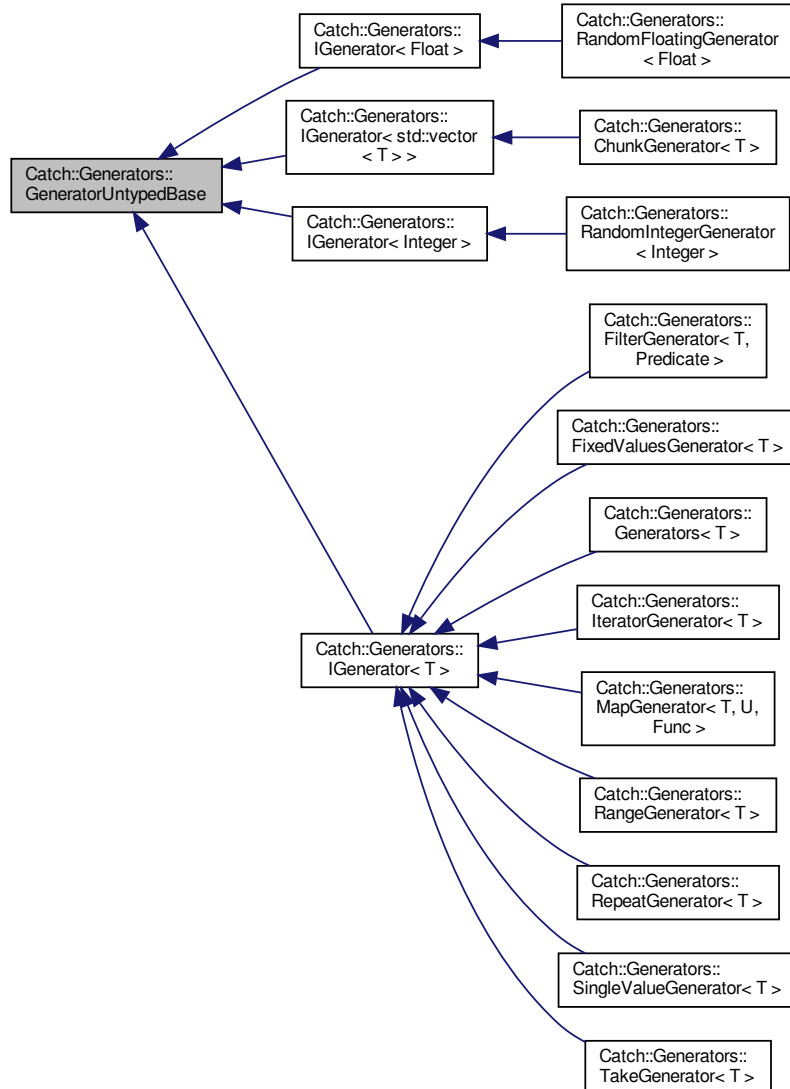
Implements [Catch::Generators::GeneratorUntypedBase](#).

The documentation for this class was generated from the following file:

- `include/catch2/catch_amalgamated.hpp`

5.97 Catch::Generators::GeneratorUntypedBase Class Reference

Inheritance diagram for Catch::Generators::GeneratorUntypedBase:



Public Member Functions

- **GeneratorUntypedBase** ([GeneratorUntypedBase](#) const &)=default
- **GeneratorUntypedBase** & **operator=** ([GeneratorUntypedBase](#) const &)=default
- bool [countedNext](#) ()
- std::size_t [currentElementIndex](#) () const
- [StringRef](#) [currentElementAsString](#) () const

5.97.1 Member Function Documentation

5.97.1.1 countedNext()

```
bool Catch::Generators::GeneratorUntypedBase::countedNext ( )
```

Attempts to move the generator to the next element

Serves as a non-virtual interface to `next`, so that the top level interface can provide sanity checking and shared features.

As with `next`, returns true iff the move succeeded and the generator has new valid element to provide.

5.97.1.2 currentElementAsString()

```
StringRef Catch::Generators::GeneratorUntypedBase::currentElementAsString ( ) const
```

Returns generator's current element as user-friendly string.

By default returns string equivalent to calling `Catch::Detail::stringify` on the current element, but generators can customize their implementation as needed.

Not thread-safe due to internal caching.

The returned ref is valid only until the generator instance is destructed, or it moves onto the next element, whichever comes first.

The documentation for this class was generated from the following file:

- `include/catch2/catch_amalgamated.hpp`

5.98 Catch::Generators::GeneratorWrapper< T > Class Template Reference

Public Member Functions

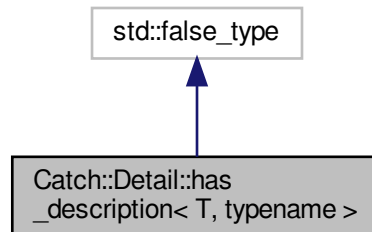
- `GeneratorWrapper` (`IGenerator`< T > *generator)
Takes ownership of the passed pointer.
- `GeneratorWrapper` (`GeneratorPtr`< T > generator)
- T const & `get` () const
- bool `next` ()

The documentation for this class was generated from the following file:

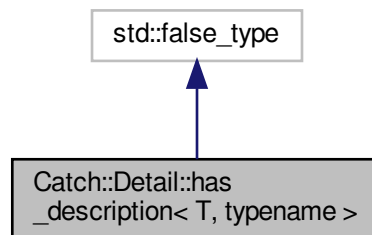
- `include/catch2/catch_amalgamated.hpp`

5.99 Catch::Detail::has_description< T, typename > Struct Template Reference

Inheritance diagram for Catch::Detail::has_description< T, typename >:



Collaboration diagram for Catch::Detail::has_description< T, typename >:

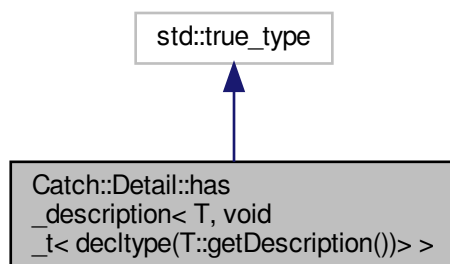


The documentation for this struct was generated from the following file:

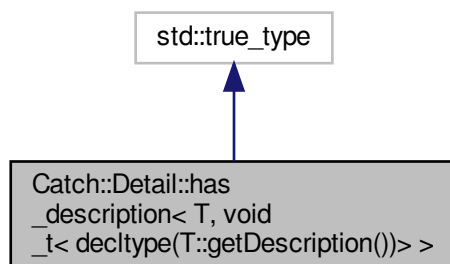
- [include/catch2/catch_amalgamated.hpp](#)

5.100 Catch::Detail::has_description< T, void_t< decltype(T::getDescription())> > Struct Template Reference

Inheritance diagram for Catch::Detail::has_description< T, void_t< decltype(T::getDescription())> >:



Collaboration diagram for Catch::Detail::has_description< T, void_t< decltype(T::getDescription())> >:

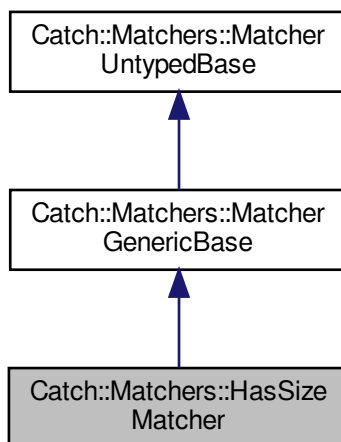


The documentation for this struct was generated from the following file:

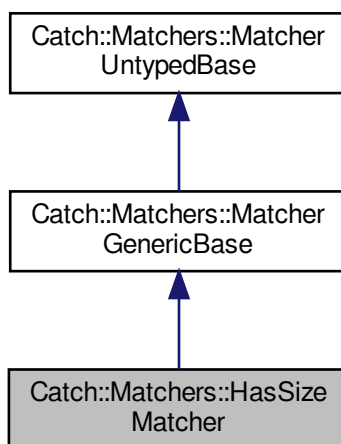
- include/catch2/[catch_amalgamated.hpp](#)

5.101 Catch::Matchers::HasSizeMatcher Class Reference

Inheritance diagram for Catch::Matchers::HasSizeMatcher:



Collaboration diagram for Catch::Matchers::HasSizeMatcher:



Public Member Functions

- **HasSizeMatcher** (std::size_t target_size)
- template<typename RangeLike >
bool **match** (RangeLike &&rng) const
- std::string **describe** () const override

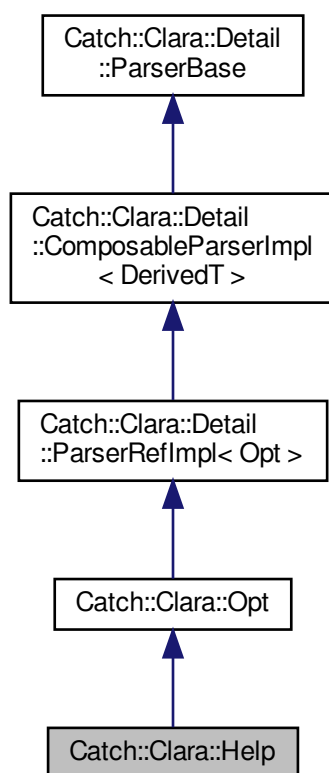
Additional Inherited Members

The documentation for this class was generated from the following file:

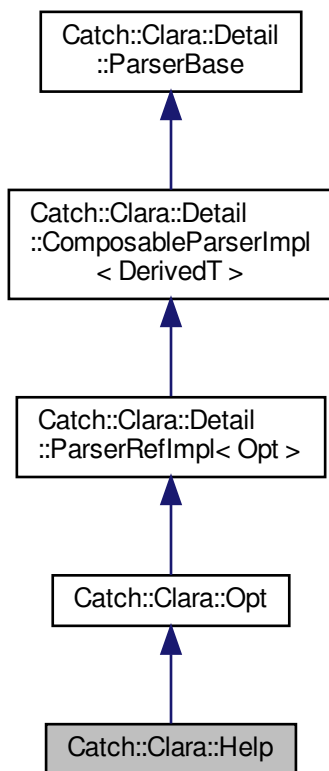
- [include/catch2/catch_amalgamated.hpp](#)

5.102 Catch::Clara::Help Struct Reference

Inheritance diagram for Catch::Clara::Help:



Collaboration diagram for Catch::Clara::Help:



Public Member Functions

- **Help** (bool &showHelpFlag)

Additional Inherited Members

The documentation for this struct was generated from the following file:

- [include/catch2/catch_amalgamated.hpp](#)

5.103 Catch::Clara::Detail::HelpColumns Struct Reference

Public Attributes

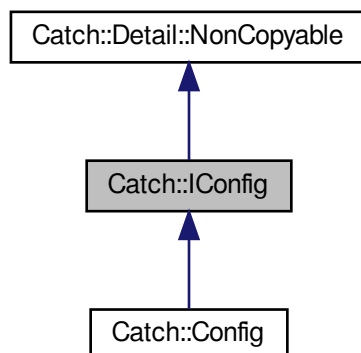
- std::string **left**
- std::string **right**

The documentation for this struct was generated from the following file:

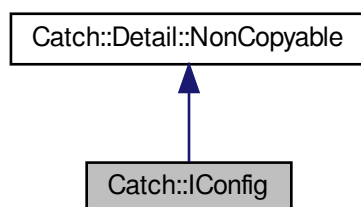
- [include/catch2/catch_amalgamated.hpp](#)

5.104 Catch::IConfig Class Reference

Inheritance diagram for Catch::IConfig:



Collaboration diagram for Catch::IConfig:



Public Member Functions

- virtual bool **allowThrows** () const =0
- virtual [StringRef](#) **name** () const =0
- virtual bool **includeSuccessfulResults** () const =0
- virtual bool **shouldDebugBreak** () const =0
- virtual bool **warnAboutMissingAssertions** () const =0
- virtual bool **warnAboutUnmatchedTestSpecs** () const =0
- virtual bool **zeroTestsCountAsSuccess** () const =0
- virtual int **abortAfter** () const =0
- virtual bool **showInvisibles** () const =0
- virtual ShowDurations **showDurations** () const =0
- virtual double **minDuration** () const =0
- virtual [TestSpec](#) const & **testSpec** () const =0

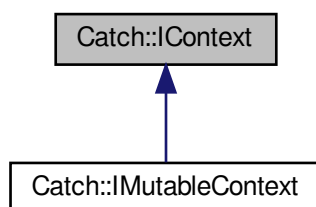
- virtual bool **hasTestFilters** () const =0
- virtual std::vector< std::string > const & **getTestsOrTags** () const =0
- virtual TestRunOrder **runOrder** () const =0
- virtual uint32_t **rngSeed** () const =0
- virtual unsigned int **shardCount** () const =0
- virtual unsigned int **shardIndex** () const =0
- virtual ColourMode **defaultColourMode** () const =0
- virtual std::vector< std::string > const & **getSectionsToRun** () const =0
- virtual Verbosity **verbosity** () const =0
- virtual bool **skipBenchmarks** () const =0
- virtual bool **benchmarkNoAnalysis** () const =0
- virtual unsigned int **benchmarkSamples** () const =0
- virtual double **benchmarkConfidenceInterval** () const =0
- virtual unsigned int **benchmarkResamples** () const =0
- virtual std::chrono::milliseconds **benchmarkWarmupTime** () const =0

The documentation for this class was generated from the following file:

- include/catch2/catch_amalgamated.hpp

5.105 Catch::IContext Class Reference

Inheritance diagram for Catch::IContext:



Public Member Functions

- virtual IResultCapture * **getResultCapture** ()=0
- virtual IConfig const * **getConfig** () const =0

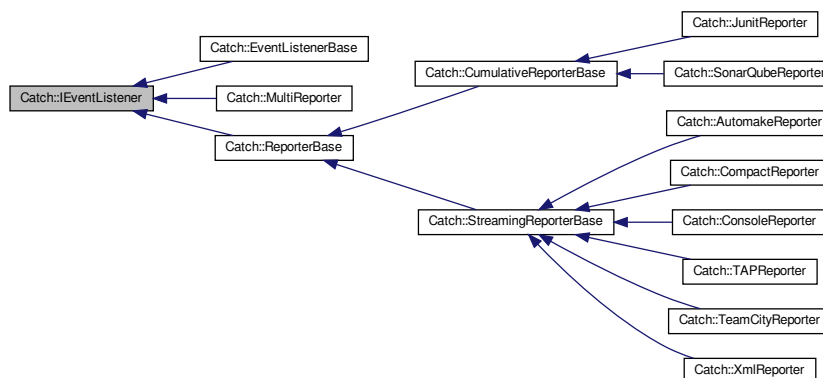
The documentation for this class was generated from the following file:

- include/catch2/catch_amalgamated.hpp

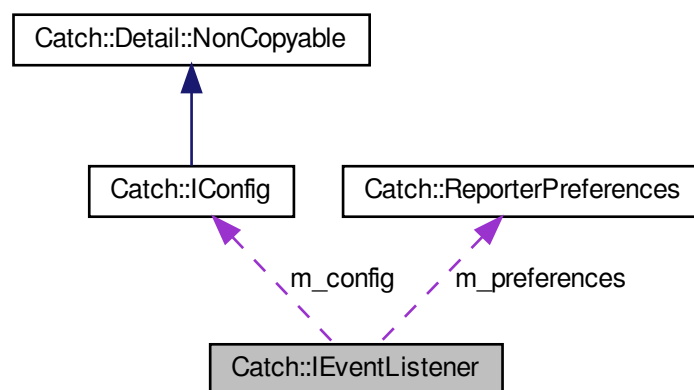
5.106 Catch::EventListener Class Reference

```
#include <catch_amalgamated.hpp>
```

Inheritance diagram for Catch::EventListener:



Collaboration diagram for Catch::EventListener:



Public Member Functions

- **EventListener** (**IConfig** const *config)
- **ReporterPreferences** const & **getPreferences** () const
- virtual void **noMatchingTestCases** (**StringRef** unmatchedSpec)=0
Called when no test cases match provided test spec.
- virtual void **reportInvalidTestSpec** (**StringRef** invalidArgument)=0
Called for all invalid test specs from the cli.
- virtual void **testRunStarting** (**TestRunInfo** const &testRunInfo)=0

- virtual void [testCaseStarting](#) ([TestCaseInfo](#) const &testInfo)=0
Called once for each TEST_CASE, no matter how many times it is entered.
- virtual void [testCasePartialStarting](#) ([TestCaseInfo](#) const &testInfo, uint64_t partNumber)=0
Called every time a TEST_CASE is entered, including repeats (due to sections)
- virtual void [sectionStarting](#) ([SectionInfo](#) const §ionInfo)=0
Called when a SECTION is being entered. Not called for skipped sections.
- virtual void [benchmarkPreparing](#) ([StringRef](#) benchmarkName)=0
Called when user-code is being probed before the actual benchmark runs.
- virtual void [benchmarkStarting](#) ([BenchmarkInfo](#) const &benchmarkInfo)=0
Called after probe but before the user-code is being benchmarked.
- virtual void [benchmarkEnded](#) ([BenchmarkStats](#)<> const &benchmarkStats)=0
Called with the benchmark results if benchmark successfully finishes.
- virtual void [benchmarkFailed](#) ([StringRef](#) benchmarkName)=0
Called if running the benchmarks fails for any reason.
- virtual void [assertionStarting](#) ([AssertionInfo](#) const &assertionInfo)=0
Called before assertion success/failure is evaluated.
- virtual void [assertionEnded](#) ([AssertionStats](#) const &assertionStats)=0
Called after assertion was fully evaluated.
- virtual void [sectionEnded](#) ([SectionStats](#) const §ionStats)=0
Called after a SECTION has finished running.
- virtual void [testCasePartialEnded](#) ([TestCaseStats](#) const &testCaseStats, uint64_t partNumber)=0
Called every time a TEST_CASE is entered, including repeats (due to sections)
- virtual void [testCaseEnded](#) ([TestCaseStats](#) const &testCaseStats)=0
Called once for each TEST_CASE, no matter how many times it is entered.
- virtual void [testRunEnded](#) ([TestRunStats](#) const &testRunStats)=0
- virtual void [skipTest](#) ([TestCaseInfo](#) const &testInfo)=0
Called with test cases that are skipped due to the test run aborting.
- virtual void [fatalErrorEncountered](#) ([StringRef](#) error)=0
Called if a fatal error (signal/structured exception) occurred.
- virtual void [listReporters](#) (std::vector< [ReporterDescription](#) > const &descriptions)=0
Writes out information about provided reporters using reporter-specific format.
- virtual void [listListeners](#) (std::vector< [ListenerDescription](#) > const &descriptions)=0
Writes out the provided listeners descriptions using reporter-specific format.
- virtual void [listTests](#) (std::vector< [TestCaseHandle](#) > const &tests)=0
Writes out information about provided tests using reporter-specific format.
- virtual void [listTags](#) (std::vector< [TagInfo](#) > const &tags)=0
Writes out information about the provided tags using reporter-specific format.

Protected Attributes

- [ReporterPreferences](#) [m_preferences](#)
Derived classes can set up their preferences here.
- [IConfig](#) const * [m_config](#)
The test run's config as filled in from CLI and defaults.

5.106.1 Detailed Description

The common base for all reporters and event listeners

Implementing classes must also implement:

```
///  
//! User-friendly description of the reporter/listener type  
static std::string getDescription()
```

Generally shouldn't be derived from by users of Catch2 directly, instead they should derive from one of the utility bases that derive from this class.

5.106.2 Member Function Documentation

5.106.2.1 testRunEnded()

```
virtual void Catch::IEventListener::testRunEnded (  
    TestRunStats const & testRunStats ) [pure virtual]
```

Called once after all tests in a testing run are finished

Not called if tests weren't run (e.g. only listings happened)

Implemented in [Catch::XmlReporter](#), [Catch::MultiReporter](#), [Catch::EventListenerBase](#), [Catch::CumulativeReporterBase](#), [Catch::TeamCityReporter](#), [Catch::TAPReporter](#), [Catch::ConsoleReporter](#), [Catch::CompactReporter](#), and [Catch::StreamingReporterBase](#).

5.106.2.2 testRunStarting()

```
virtual void Catch::IEventListener::testRunStarting (  
    TestRunInfo const & testRunInfo ) [pure virtual]
```

Called once in a testing run before tests are started

Not called if tests won't be run (e.g. only listing will happen)

Implemented in [Catch::SonarQubeReporter](#), [Catch::MultiReporter](#), [Catch::EventListenerBase](#), [Catch::XmlReporter](#), [Catch::TAPReporter](#), [Catch::JUnitReporter](#), [Catch::TeamCityReporter](#), [Catch::ConsoleReporter](#), [Catch::StreamingReporterBase](#), [Catch::CompactReporter](#), and [Catch::CumulativeReporterBase](#).

The documentation for this class was generated from the following file:

- [include/catch2/catch_amalgamated.hpp](#)

5.107 Catch::IExceptionTranslator Class Reference

Public Member Functions

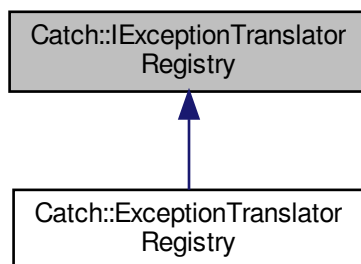
- virtual std::string **translate** (ExceptionTranslators::const_iterator it, ExceptionTranslators::const_iterator it↔ End) const =0

The documentation for this class was generated from the following file:

- include/catch2/[catch_amalgamated.hpp](#)

5.108 Catch::IExceptionTranslatorRegistry Class Reference

Inheritance diagram for Catch::IExceptionTranslatorRegistry:



Public Member Functions

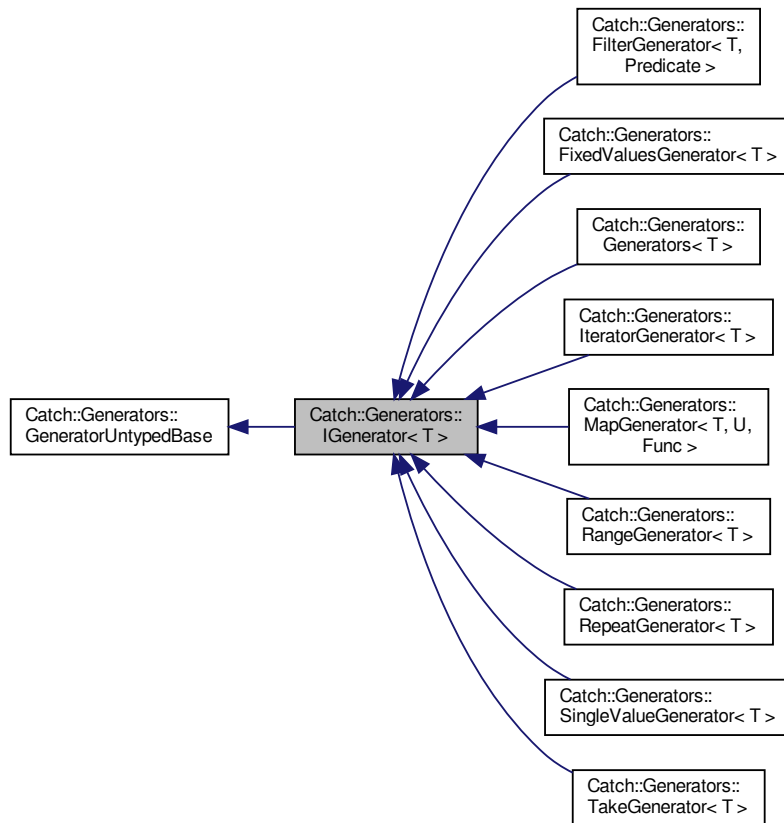
- virtual std::string **translateActiveException** () const =0

The documentation for this class was generated from the following file:

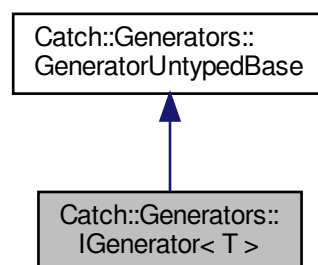
- include/catch2/[catch_amalgamated.hpp](#)

5.109 Catch::Generators::IGenerator< T > Class Template Reference

Inheritance diagram for Catch::Generators::IGenerator< T >:



Collaboration diagram for Catch::Generators::IGenerator< T >:



Public Types

- using `type` = `T`

Public Member Functions

- **IGenerator** ([IGenerator](#) const &)=default
- [IGenerator](#) & **operator=** ([IGenerator](#) const &)=default
- virtual T const & **get** () const =0

The documentation for this class was generated from the following file:

- include/catch2/[catch_amalgamated.hpp](#)

5.110 Catch::IGeneratorTracker Class Reference

Public Member Functions

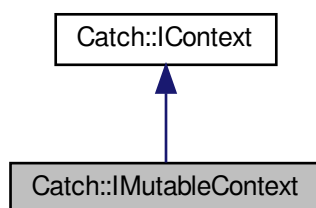
- virtual auto **hasGenerator** () const -> bool=0
- virtual auto **getGenerator** () const -> [Generators::GeneratorBasePtr](#) const &=0
- virtual void **setGenerator** ([Generators::GeneratorBasePtr](#) &&generator)=0

The documentation for this class was generated from the following file:

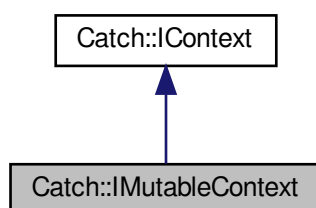
- include/catch2/[catch_amalgamated.hpp](#)

5.111 Catch::IMutableContext Class Reference

Inheritance diagram for Catch::IMutableContext:



Collaboration diagram for Catch::IMutableContext:



Public Member Functions

- virtual void **setResultCapture** ([IResultCapture](#) *resultCapture)=0
- virtual void **setConfig** ([IConfig](#) const *config)=0

Friends

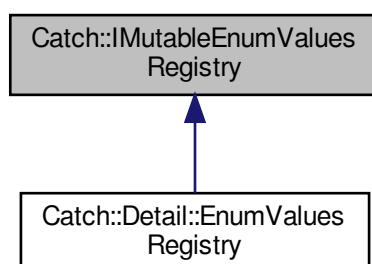
- [ImmutableContext](#) & **getCurrentMutableContext** ()
- void **cleanUpContext** ()

The documentation for this class was generated from the following file:

- include/catch2/catch_amalgamated.hpp

5.112 Catch::ImmutableEnumValuesRegistry Class Reference

Inheritance diagram for Catch::ImmutableEnumValuesRegistry:



Public Member Functions

- virtual [Detail::EnumInfo](#) const & **registerEnum** ([StringRef](#) enumName, [StringRef](#) allEnums, std::vector< int > const &values)=0
- template<typename E > [Detail::EnumInfo](#) const & **registerEnum** ([StringRef](#) enumName, [StringRef](#) allEnums, std::initializer_list< E > values)

The documentation for this class was generated from the following file:

- include/catch2/catch_amalgamated.hpp

5.113 Catch::IMutableRegistryHub Class Reference

Public Member Functions

- virtual void **registerReporter** (std::string const &name, [IReporterFactoryPtr](#) factory)=0
- virtual void **registerListener** ([Detail::unique_ptr< EventListenerFactory >](#) factory)=0
- virtual void **registerTest** ([Detail::unique_ptr< TestCaseInfo >](#) &&testInfo, [Detail::unique_ptr< ITestInvoker >](#) &&invoker)=0
- virtual void **registerTranslator** ([Detail::unique_ptr< IExceptionTranslator >](#) &&translator)=0
- virtual void **registerTagAlias** (std::string const &alias, std::string const &>tag, [SourceLineInfo](#) const &lineInfo)=0
- virtual void **registerStartupException** () noexcept=0
- virtual [IMutableEnumValuesRegistry](#) & **getMutableEnumValuesRegistry** ()=0

The documentation for this class was generated from the following file:

- include/catch2/[catch_amalgamated.hpp](#)

5.114 Catch::IRegistryHub Class Reference

Public Member Functions

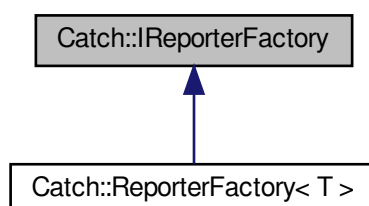
- virtual [IReporterRegistry](#) const & **getReporterRegistry** () const =0
- virtual [ITestCaseRegistry](#) const & **getTestCaseRegistry** () const =0
- virtual [ITagAliasRegistry](#) const & **getTagAliasRegistry** () const =0
- virtual [IExceptionTranslatorRegistry](#) const & **getExceptionTranslatorRegistry** () const =0
- virtual [StartupExceptionRegistry](#) const & **getStartupExceptionRegistry** () const =0

The documentation for this class was generated from the following file:

- include/catch2/[catch_amalgamated.hpp](#)

5.115 Catch::IReporterFactory Class Reference

Inheritance diagram for Catch::IReporterFactory:



Public Member Functions

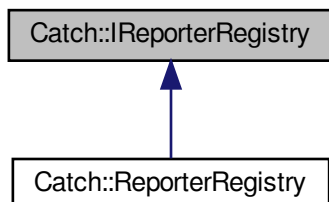
- virtual [IEventListenerPtr](#) **create** ([ReporterConfig](#) &&config) const =0
- virtual std::string **getDescription** () const =0

The documentation for this class was generated from the following file:

- include/catch2/[catch_amalgamated.hpp](#)

5.116 Catch::IReporterRegistry Class Reference

Inheritance diagram for Catch::IReporterRegistry:



Public Types

- using **FactoryMap** = std::map< std::string, [IReporterFactoryPtr](#), [Detail::CaseInsensitiveLess](#) >
- using **Listeners** = std::vector< [Detail::unique_ptr](#)< [EventListenerFactory](#) > >

Public Member Functions

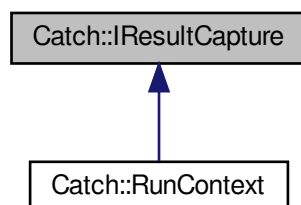
- virtual [IEventListenerPtr](#) **create** (std::string const &name, [ReporterConfig](#) &&config) const =0
- virtual FactoryMap const & **getFactories** () const =0
- virtual Listeners const & **getListeners** () const =0

The documentation for this class was generated from the following file:

- include/catch2/[catch_amalgamated.hpp](#)

5.117 Catch::IResultCapture Class Reference

Inheritance diagram for Catch::IResultCapture:



Public Member Functions

- virtual bool **sectionStarted** ([SectionInfo](#) const §ionInfo, [Counts](#) &assertions)=0
- virtual void **sectionEnded** ([SectionEndInfo](#) const &endInfo)=0
- virtual void **sectionEndedEarly** ([SectionEndInfo](#) const &endInfo)=0
- virtual auto **acquireGeneratorTracker** ([StringRef](#) generatorName, [SourceLineInfo](#) const &lineInfo) -> [IGeneratorTracker](#) &=0
- virtual void **benchmarkPreparing** ([StringRef](#) name)=0
- virtual void **benchmarkStarting** ([BenchmarkInfo](#) const &info)=0
- virtual void **benchmarkEnded** ([BenchmarkStats](#)<> const &stats)=0
- virtual void **benchmarkFailed** ([StringRef](#) error)=0
- virtual void **pushScopedMessage** ([MessageInfo](#) const &message)=0
- virtual void **popScopedMessage** ([MessageInfo](#) const &message)=0
- virtual void **emplaceUnscopedMessage** ([MessageBuilder](#) const &builder)=0
- virtual void **handleFatalErrorCondition** ([StringRef](#) message)=0
- virtual void **handleExpr** ([AssertionInfo](#) const &info, [ITransientExpression](#) const &expr, [AssertionReaction](#) &reaction)=0
- virtual void **handleMessage** ([AssertionInfo](#) const &info, [ResultWas::OfType](#) resultType, [StringRef](#) message, [AssertionReaction](#) &reaction)=0
- virtual void **handleUnexpectedExceptionNotThrown** ([AssertionInfo](#) const &info, [AssertionReaction](#) &reaction)=0
- virtual void **handleUnexpectedInflightException** ([AssertionInfo](#) const &info, [std::string](#) const &message, [AssertionReaction](#) &reaction)=0
- virtual void **handleIncomplete** ([AssertionInfo](#) const &info)=0
- virtual void **handleNonExpr** ([AssertionInfo](#) const &info, [ResultWas::OfType](#) resultType, [AssertionReaction](#) &reaction)=0
- virtual bool **lastAssertionPassed** ()=0
- virtual void **assertionPassed** ()=0
- virtual [std::string](#) **getCurrentTestName** () const =0
- virtual const [AssertionResult](#) * **getLastResult** () const =0
- virtual void **exceptionEarlyReported** ()=0

The documentation for this class was generated from the following file:

- [include/catch2/catch_amalgamated.hpp](#)

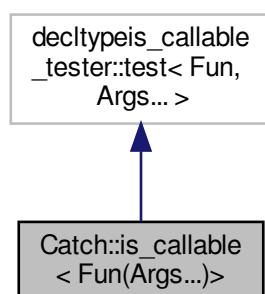
5.118 Catch::is_callable< T > Struct Template Reference

The documentation for this struct was generated from the following file:

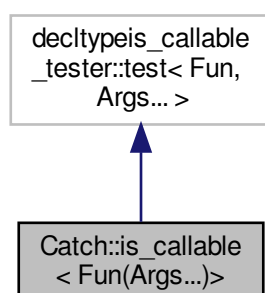
- [include/catch2/catch_amalgamated.hpp](#)

5.119 Catch::is_callable< Fun(Args...)> Struct Template Reference

Inheritance diagram for Catch::is_callable< Fun(Args...)>:



Collaboration diagram for Catch::is_callable< Fun(Args...)>:



The documentation for this struct was generated from the following file:

- [include/catch2/catch_amalgamated.hpp](#)

5.120 Catch::is_callable_tester Struct Reference

Static Public Member Functions

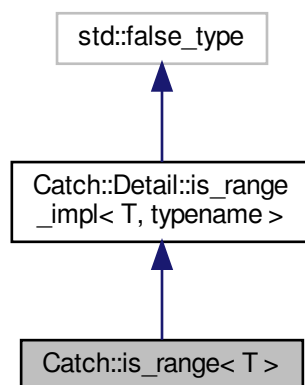
- `template<typename Fun , typename... Args>
static true_given< decltype(std::declval< Fun >)(std::declval< Args >)...>> test (int)`
- `template<typename... >
static std::false_type test (...)`

The documentation for this struct was generated from the following file:

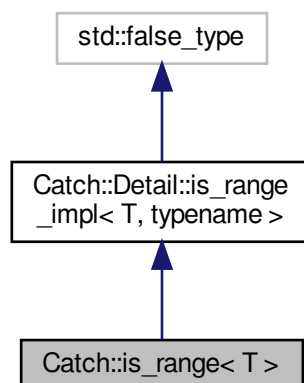
- `include/catch2/catch_amalgamated.hpp`

5.121 Catch::is_range< T > Struct Template Reference

Inheritance diagram for Catch::is_range< T >:



Collaboration diagram for Catch::is_range< T >:

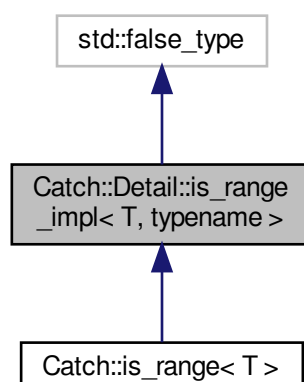


The documentation for this struct was generated from the following file:

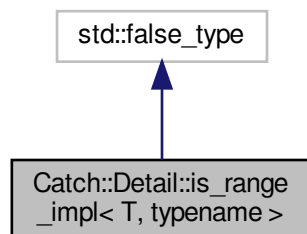
- [include/catch2/catch_amalgamated.hpp](#)

5.122 Catch::Detail::is_range_impl< T, typename > Struct Template Reference

Inheritance diagram for Catch::Detail::is_range_impl< T, typename >:



Collaboration diagram for `Catch::Detail::is_range_impl< T, typename >`:

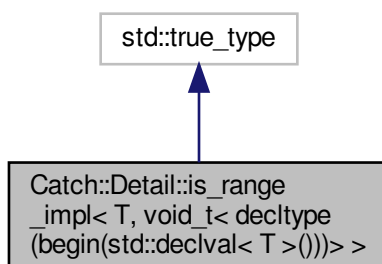


The documentation for this struct was generated from the following file:

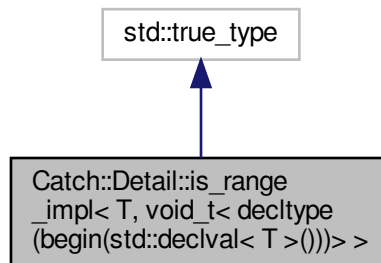
- [include/catch2/catch_amalgamated.hpp](#)

5.123 `Catch::Detail::is_range_impl< T, void_t< decltype(begin(std::declval< T >()))>>` > Struct Template Reference

Inheritance diagram for `Catch::Detail::is_range_impl< T, void_t< decltype(begin(std::declval< T >()))>>` >:



Collaboration diagram for Catch::Detail::is_range_impl< T, void_t< decltype(begin(std::declval< T >()))> >:

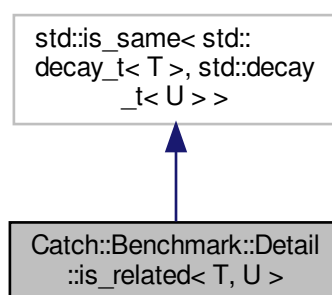


The documentation for this struct was generated from the following file:

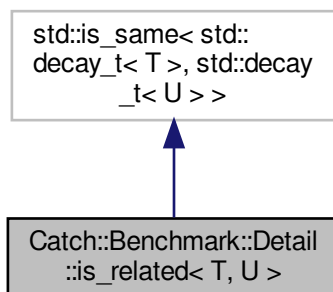
- [include/catch2/catch_amalgamated.hpp](#)

5.124 Catch::Benchmark::Detail::is_related< T, U > Struct Template Reference

Inheritance diagram for Catch::Benchmark::Detail::is_related< T, U >:



Collaboration diagram for `Catch::Benchmark::Detail::is_related< T, U >`:

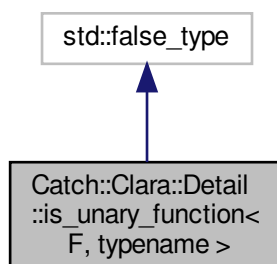


The documentation for this struct was generated from the following file:

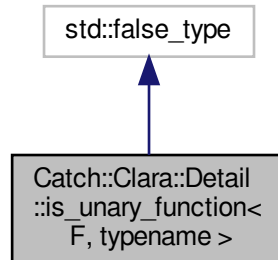
- `include/catch2/catch_amalgamated.hpp`

5.125 `Catch::Clara::Detail::is_unary_function< F, typename >` Struct Template Reference

Inheritance diagram for `Catch::Clara::Detail::is_unary_function< F, typename >`:



Collaboration diagram for Catch::Clara::Detail::is_unary_function< F, typename >:

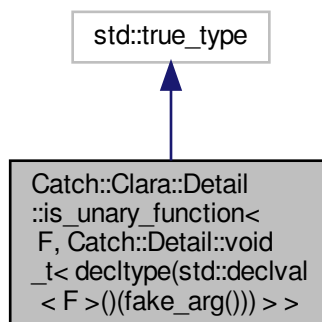


The documentation for this struct was generated from the following file:

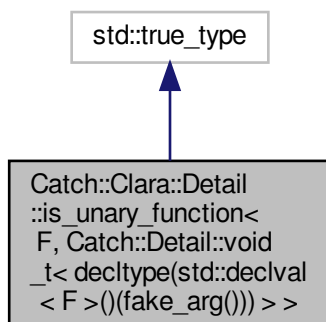
- [include/catch2/catch_amalgamated.hpp](#)

5.126 Catch::Clara::Detail::is_unary_function< F, Catch::Detail::void_t< decltype(std::declval< F >())(fake_arg())> > > Struct Template Reference

Inheritance diagram for Catch::Clara::Detail::is_unary_function< F, Catch::Detail::void_t< decltype(std::declval< F >())(fake_arg())> > >:



Collaboration diagram for `Catch::Clara::Detail::is_unary_function< F, Catch::Detail::void_t< decltype(std::declval< F >()(fake_arg())) > >`:

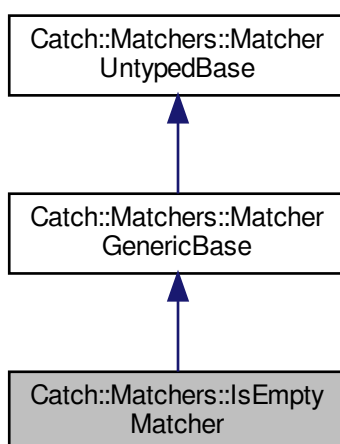


The documentation for this struct was generated from the following file:

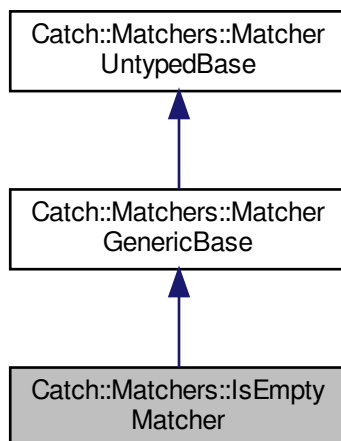
- [include/catch2/catch_amalgamated.hpp](#)

5.127 Catch::Matchers::IsEmptyMatcher Class Reference

Inheritance diagram for `Catch::Matchers::IsEmptyMatcher`:



Collaboration diagram for Catch::Matchers::IsEmptyMatcher:



Public Member Functions

- `template<typename RangeLike >`
`bool match (RangeLike &&rng) const`
- `std::string describe () const` override

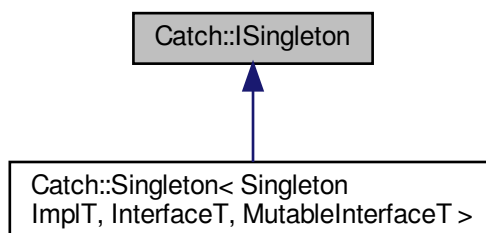
Additional Inherited Members

The documentation for this class was generated from the following file:

- `include/catch2/catch_amalgamated.hpp`

5.128 Catch::ISingleton Struct Reference

Inheritance diagram for Catch::ISingleton:



The documentation for this struct was generated from the following file:

- include/catch2/[catch_amalgamated.hpp](#)

5.129 Catch::Detail::IsStreamInsertable< T > Class Template Reference

Static Public Attributes

- static const bool **value** = decltype(test<std::ostream, const T&>(0))::value

The documentation for this class was generated from the following file:

- include/catch2/[catch_amalgamated.hpp](#)

5.130 Catch::IStream Class Reference

Public Member Functions

- virtual std::ostream & **stream** ()=0
- virtual bool [isConsole](#) () const

5.130.1 Member Function Documentation

5.130.1.1 isConsole()

```
virtual bool Catch::IStream::isConsole ( ) const [inline], [virtual]
```

Best guess on whether the instance is writing to a console (e.g. via stdout/stderr)

This is useful for e.g. Win32 colour support, because the Win32 API manipulates console directly, unlike POSIX escape codes, that can be written anywhere.

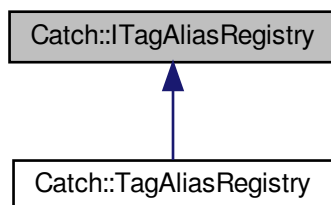
Due to variety of ways to change where the stdout/stderr is *actually* being written, users should always assume that the answer might be wrong.

The documentation for this class was generated from the following file:

- include/catch2/[catch_amalgamated.hpp](#)

5.131 Catch::ITagAliasRegistry Class Reference

Inheritance diagram for Catch::ITagAliasRegistry:



Public Member Functions

- virtual [TagAlias](#) const * **find** (std::string const &alias) const =0
- virtual std::string **expandAliases** (std::string const &unexpandedTestSpec) const =0

Static Public Member Functions

- static [ITagAliasRegistry](#) const & **get** ()

The documentation for this class was generated from the following file:

- include/catch2/[catch_amalgamated.hpp](#)

5.132 Catch::TextFlow::Columns::iterator Class Reference

Public Types

- using **difference_type** = std::ptrdiff_t
- using **value_type** = std::string
- using **pointer** = value_type *
- using **reference** = value_type &
- using **iterator_category** = std::forward_iterator_tag

Public Member Functions

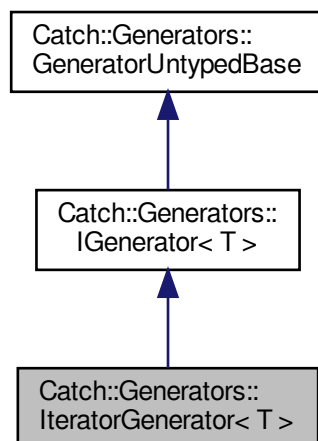
- **iterator** ([Columns](#) const &columns)
- auto **operator==** ([iterator](#) const &other) const -> bool
- auto **operator!=** ([iterator](#) const &other) const -> bool
- std::string **operator*** () const
- [iterator](#) & **operator++** ()
- [iterator](#) **operator++** (int)

The documentation for this class was generated from the following file:

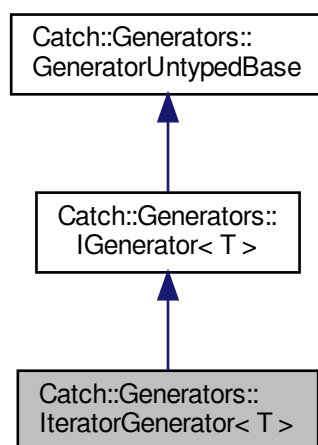
- include/catch2/[catch_amalgamated.hpp](#)

5.133 Catch::Generators::IteratorGenerator< T > Class Template Reference

Inheritance diagram for Catch::Generators::IteratorGenerator< T >:



Collaboration diagram for Catch::Generators::IteratorGenerator< T >:



Public Member Functions

- `template<typename InputIterator , typename InputSentinel >`
IteratorGenerator (InputIterator first, InputSentinel last)
- `T const & get () const` override
- `bool next ()` override

Additional Inherited Members

5.133.1 Member Function Documentation

5.133.1.1 next()

```
template<typename T >
bool Catch::Generators::IteratorGenerator< T >::next ( ) [inline], [override], [virtual]
```

Attempts to move the generator to the next element

Returns true iff the move succeeded (and a valid element can be retrieved).

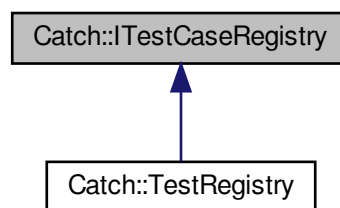
Implements [Catch::Generators::GeneratorUntypedBase](#).

The documentation for this class was generated from the following file:

- include/catch2/catch_amalgamated.hpp

5.134 Catch::ITestCaseRegistry Class Reference

Inheritance diagram for Catch::ITestCaseRegistry:



Public Member Functions

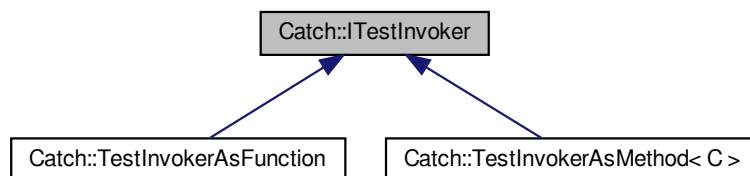
- virtual std::vector< [TestCaseInfo](#) * > const & **getAllInfos** () const =0
- virtual std::vector< [TestCaseHandle](#) > const & **getAllTests** () const =0
- virtual std::vector< [TestCaseHandle](#) > const & **getAllTestsSorted** ([IConfig](#) const &config) const =0

The documentation for this class was generated from the following file:

- include/catch2/catch_amalgamated.hpp

5.135 Catch::ITestInvoker Class Reference

Inheritance diagram for Catch::ITestInvoker:



Public Member Functions

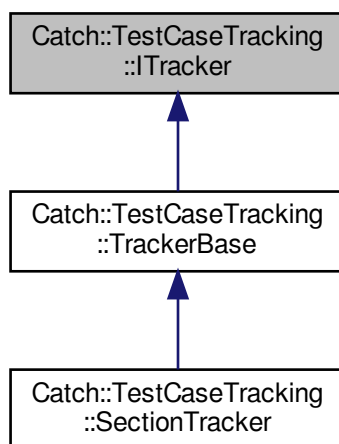
- virtual void **invoke** () const =0

The documentation for this class was generated from the following file:

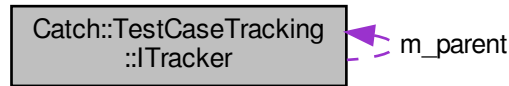
- include/catch2/[catch_amalgamated.hpp](#)

5.136 Catch::TestCaseTracking::ITracker Class Reference

Inheritance diagram for Catch::TestCaseTracking::ITracker:



Collaboration diagram for Catch::TestCaseTracking::ITracker:



Public Member Functions

- **ITracker** ([NameAndLocation](#) const &nameAndLoc, [ITracker](#) *parent)
- [NameAndLocation](#) const & **nameAndLocation** () const
- [ITracker](#) * **parent** () const
- virtual bool [isComplete](#) () const =0
Returns true if tracker run to completion (successfully or not)
- bool [isSuccessfullyCompleted](#) () const
Returns true if tracker run to completion succesfully.
- bool [isOpen](#) () const
Returns true if tracker has started but hasn't been completed.
- bool [hasStarted](#) () const
Returns true iff tracker has started.
- virtual void **close** ()=0
- virtual void **fail** ()=0
- void **markAsNeedingAnotherRun** ()
- void [addChild](#) ([ITrackerPtr](#) &&child)
Register a nested ITracker.
- [ITracker](#) * [findChild](#) ([NameAndLocation](#) const &nameAndLocation)
- bool [hasChildren](#) () const
Have any children been added?
- void [openChild](#) ()
Marks tracker as executing a child, doing se recursively up the tree.
- virtual bool [isSectionTracker](#) () const
- virtual bool [isGeneratorTracker](#) () const

Protected Types

- enum **CycleState** {
 NotStarted , **Executing** , **ExecutingChildren** , **NeedsAnotherRun** ,
 CompletedSuccessfully , **Failed** }

Protected Attributes

- [ITracker](#) * **m_parent** = nullptr
- Children **m_children**
- CycleState **m_runState** = NotStarted

5.136.1 Member Function Documentation

5.136.1.1 findChild()

```
ITracker* Catch::TestCaseTracking::ITracker::findChild (
    NameAndLocation const & nameAndLocation )
```

Returns ptr to specific child if register with this tracker.

Returns nullptr if not found.

5.136.1.2 isGeneratorTracker()

```
virtual bool Catch::TestCaseTracking::ITracker::isGeneratorTracker ( ) const [virtual]
```

Returns true if the instance is a generator tracker

Subclasses should override to true if they are, replaces RTTI for internal debug checks.

5.136.1.3 isSectionTracker()

```
virtual bool Catch::TestCaseTracking::ITracker::isSectionTracker ( ) const [virtual]
```

Returns true if the instance is a section tracker

Subclasses should override to true if they are, replaces RTTI for internal debug checks.

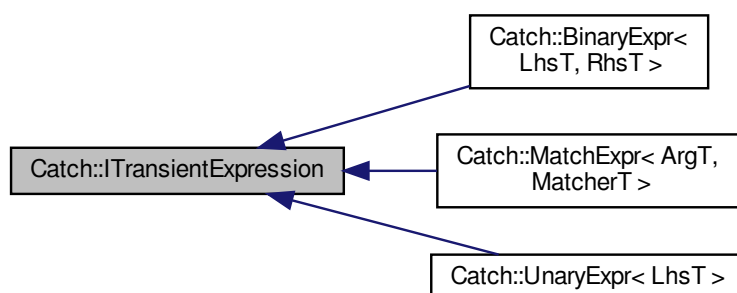
Reimplemented in [Catch::TestCaseTracking::SectionTracker](#).

The documentation for this class was generated from the following file:

- [include/catch2/catch_amalgamated.hpp](#)

5.137 Catch::ITransientExpression Class Reference

Inheritance diagram for Catch::ITransientExpression:



Public Member Functions

- auto **isBinaryExpression** () const -> bool
- auto **getResult** () const -> bool
- virtual void **streamReconstructedExpression** (std::ostream &os) const =0
- **ITransientExpression** (bool isBinaryExpression, bool result)
- **ITransientExpression** (**ITransientExpression** const &)=default
- **ITransientExpression** & **operator=** (**ITransientExpression** const &)=default

Friends

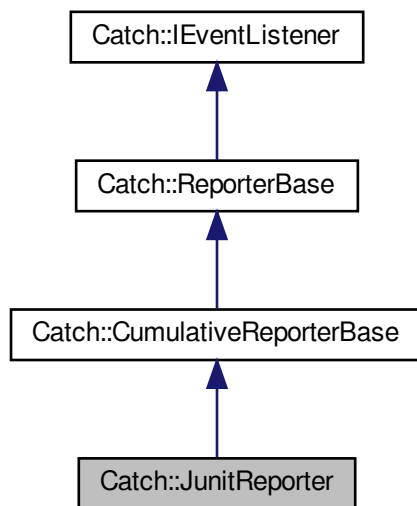
- std::ostream & **operator**<< (std::ostream &out, **ITransientExpression** const &expr)

The documentation for this class was generated from the following file:

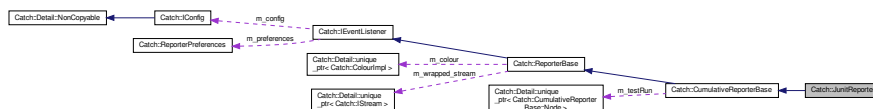
- include/catch2/catch_amalgamated.hpp

5.138 Catch::JunitReporter Class Reference

Inheritance diagram for Catch::JunitReporter:



Collaboration diagram for Catch::JunitReporter:



Public Member Functions

- **JunitReporter** ([ReporterConfig](#) &&_config)
- void [testRunStarting](#) ([TestRunInfo](#) const &runInfo) override
- void [testCaseStarting](#) ([TestCaseInfo](#) const &testCaseInfo) override
Called once for each TEST_CASE, no matter how many times it is entered.
- void [assertionEnded](#) ([AssertionStats](#) const &assertionStats) override
Called after assertion was fully evaluated.
- void [testCaseEnded](#) ([TestCaseStats](#) const &testCaseStats) override
Called once for each TEST_CASE, no matter how many times it is entered.
- void [testRunEndedCumulative](#) () override
Customization point: called after last test finishes (testRunEnded has been handled)

Static Public Member Functions

- static std::string [getDescription](#) ()

Additional Inherited Members

5.138.1 Member Function Documentation

5.138.1.1 testRunStarting()

```
void Catch::JunitReporter::testRunStarting (
    TestRunInfo const & testRunInfo ) [override], [virtual]
```

Called once in a testing run before tests are started

Not called if tests won't be run (e.g. only listing will happen)

Reimplemented from [Catch::CumulativeReporterBase](#).

The documentation for this class was generated from the following file:

- include/catch2/[catch_amalgamated.hpp](#)

5.139 Catch::Clara::Detail::LambdaInvoker< ReturnType > Struct Template Reference

Static Public Member Functions

- template<typename L, typename ArgType >
static auto **invoke** (L const &lambda, ArgType const &arg) -> [ParserResult](#)

The documentation for this struct was generated from the following file:

- include/catch2/[catch_amalgamated.hpp](#)

5.140 Catch::Clara::Detail::LambdaInvoker< void > Struct Reference

Static Public Member Functions

- `template<typename L, typename ArgType >`
`static auto invoke (L const &lambda, ArgType const &arg) -> ParserResult`

The documentation for this struct was generated from the following file:

- `include/catch2/catch_amalgamated.hpp`

5.141 Catch::LazyExpression Class Reference

Public Member Functions

- `LazyExpression (bool isNegated)`
- `LazyExpression (LazyExpression const &other)=default`
- `LazyExpression & operator= (LazyExpression const &)=delete`
- `operator bool () const`

Friends

- `class AssertionHandler`
- `struct AssertionStats`
- `class RunContext`
- `auto operator<< (std::ostream &os, LazyExpression const &lazyExpr) -> std::ostream &`

The documentation for this class was generated from the following file:

- `include/catch2/catch_amalgamated.hpp`

5.142 Catch::LeakDetector Struct Reference

The documentation for this struct was generated from the following file:

- `include/catch2/catch_amalgamated.hpp`

5.143 LFMCMC< TData > Class Template Reference

Likelihood-Free Markov Chain Monte Carlo.

```
#include <lfmcmc-bones.hpp>
```

Public Member Functions

- void **run** (std::vector< epiworld_double > param_init, size_t n_samples_, epiworld_double epsilon_)
- **LFMCMC** (TData &observed_data_)
- void **set_observed_data** (TData &observed_data_)
- void **set_proposal_fun** (LFMCMCProposalFun< TData > fun)
- void **set_simulation_fun** (LFMCMCSimFun< TData > fun)
- void **set_summary_fun** (LFMCMCSummaryFun< TData > fun)
- void **set_kernel_fun** (LFMCMCKernelFun< TData > fun)
- const size_t **get_n_samples** ()
- const size_t **get_n_statistics** ()
- const size_t **get_n_parameters** ()
- const epiworld_double **get_epsilon** ()
- const std::vector< epiworld_double > & **get_params_now** ()
- const std::vector< epiworld_double > & **get_params_prev** ()
- const std::vector< epiworld_double > & **get_params_init** ()
- const std::vector< epiworld_double > & **get_statistics_obs** ()
- const std::vector< epiworld_double > & **get_statistics_hist** ()
- const std::vector< bool > & **get_statistics_accepted** ()
- const std::vector< epiworld_double > & **get_posterior_if_prob** ()
- const std::vector< epiworld_double > & **get_drawn_prob** ()
- std::vector< TData > * **get_sampled_data** ()
- void **set_par_names** (std::vector< std::string > names)
- void **set_stats_names** (std::vector< std::string > names)
- void **print** ()

Random number generation

Parameters

eng	
-----	--

- void **set_rand_engine** (std::mt19937 &eng)
- std::mt19937 * **get_rand_engine** ()
- void **seed** (unsigned int s)
- void **set_rand_gamma** (epiworld_double alpha, epiworld_double beta)
- epiworld_double **runif** ()
- epiworld_double **rnorm** ()
- epiworld_double **rgamma** ()
- epiworld_double **runif** (epiworld_double lb, epiworld_double ub)
- epiworld_double **rnorm** (epiworld_double mean, epiworld_double sd)
- epiworld_double **rgamma** (epiworld_double alpha, epiworld_double beta)

5.143.1 Detailed Description

```
template<typename TData>
class LFMCMC< TData >
```

Likelihood-Free Markov Chain Monte Carlo.

Template Parameters

<i>TData</i>	Type of data that is generated
--------------	--------------------------------

The documentation for this class was generated from the following files:

- include/epiworld/math/lfmcmc/lfmcmc-bones.hpp
- include/epiworld/math/lfmcmc/lfmcmc-meat-print.hpp
- include/epiworld/math/lfmcmc/lfmcmc-meat.hpp

5.144 Catch::lineOfChars Struct Reference

Public Member Functions

- constexpr **lineOfChars** (char c_)

Public Attributes

- char **c**

Friends

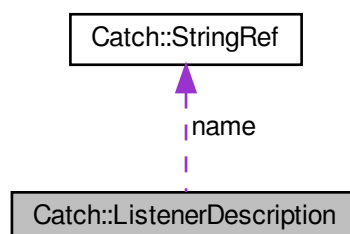
- std::ostream & **operator**<< (std::ostream &out, [lineOfChars](#) value)

The documentation for this struct was generated from the following file:

- include/catch2/[catch_amalgamated.hpp](#)

5.145 Catch::ListenerDescription Struct Reference

Collaboration diagram for Catch::ListenerDescription:



Public Attributes

- [StringRef](#) **name**
- `std::string` **description**

The documentation for this struct was generated from the following file:

- `include/catch2/catch_amalgamated.hpp`

5.146 `Catch::ListenerRegistrar< T >` Class Template Reference

Public Member Functions

- **ListenerRegistrar** ([StringRef](#) listenerName)

The documentation for this class was generated from the following file:

- `include/catch2/catch_amalgamated.hpp`

5.147 `Catch::Detail::make_void<... >` Struct Template Reference

Public Types

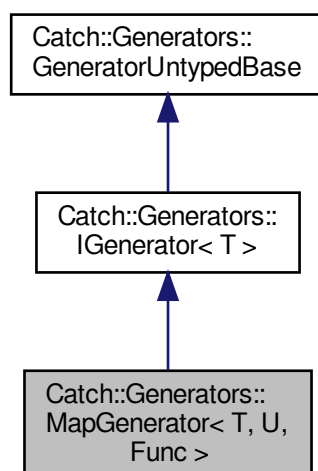
- using **type** = void

The documentation for this struct was generated from the following file:

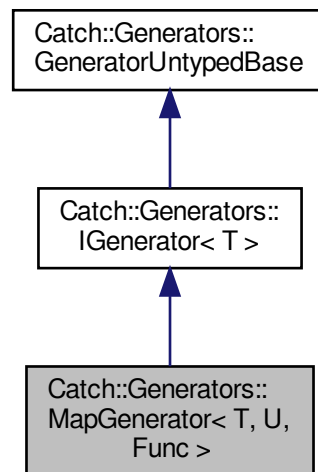
- `include/catch2/catch_amalgamated.hpp`

5.148 `Catch::Generators::MapGenerator< T, U, Func >` Class Template Reference

Inheritance diagram for `Catch::Generators::MapGenerator< T, U, Func >`:



Collaboration diagram for Catch::Generators::MapGenerator< T, U, Func >:



Public Member Functions

- `template<typename F2 = Func>`
MapGenerator (F2 &&function, [GeneratorWrapper](#)< U > &&generator)
- T const & **get** () const override
- bool [next](#) () override

Additional Inherited Members

5.148.1 Member Function Documentation

5.148.1.1 [next\(\)](#)

```

template<typename T , typename U , typename Func >
bool Catch::Generators::MapGenerator< T, U, Func >::next ( ) [inline], [override], [virtual]

```

Attempts to move the generator to the next element

Returns true iff the move succeeded (and a valid element can be retrieved).

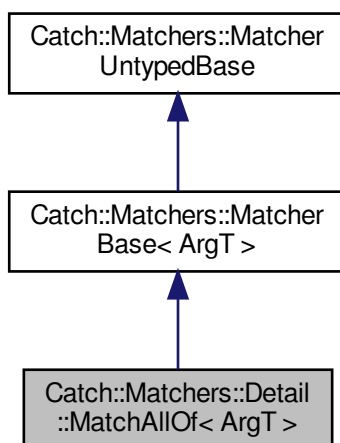
Implements [Catch::Generators::GeneratorUntypedBase](#).

The documentation for this class was generated from the following file:

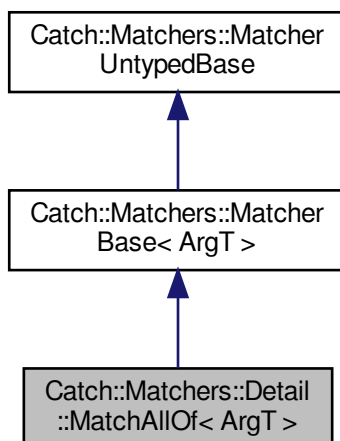
- `include/catch2/catch_amalgamated.hpp`

5.149 Catch::Matchers::Detail::MatchAllOf< ArgT > Class Template Reference

Inheritance diagram for Catch::Matchers::Detail::MatchAllOf< ArgT >:



Collaboration diagram for Catch::Matchers::Detail::MatchAllOf< ArgT >:



Public Member Functions

- **MatchAllOf** ([MatchAllOf](#) const &)=delete

- [MatchAllOf](#) & **operator=** ([MatchAllOf](#) const &)=delete
- **MatchAllOf** ([MatchAllOf](#) &&)=default
- [MatchAllOf](#) & **operator=** ([MatchAllOf](#) &&)=default
- bool **match** (ArgT const &arg) const override
- std::string **describe** () const override

Friends

- [MatchAllOf](#) **operator&&** ([MatchAllOf](#) &&lhs, [MatcherBase](#)< ArgT > const &rhs)
- [MatchAllOf](#) **operator&&** ([MatcherBase](#)< ArgT > const &lhs, [MatchAllOf](#) &&rhs)

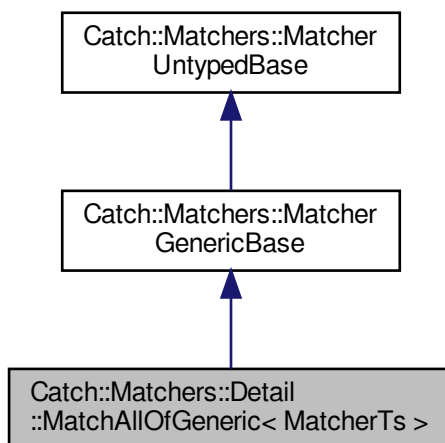
Additional Inherited Members

The documentation for this class was generated from the following file:

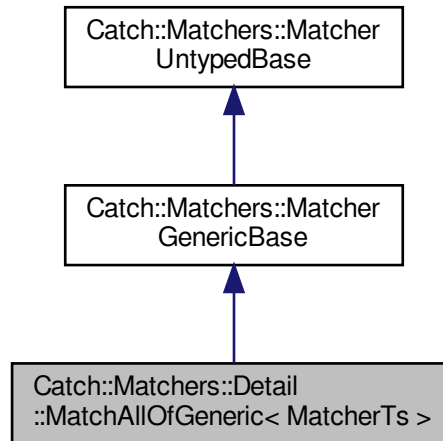
- include/catch2/[catch_amalgamated.hpp](#)

5.150 Catch::Matchers::Detail::MatchAllOfGeneric< MatcherTs > Class Template Reference

Inheritance diagram for Catch::Matchers::Detail::MatchAllOfGeneric< MatcherTs >:



Collaboration diagram for `Catch::Matchers::Detail::MatchAllOfGeneric< MatcherTs >`:



Public Member Functions

- **MatchAllOfGeneric** ([MatchAllOfGeneric](#) const &)=delete
- **MatchAllOfGeneric** & **operator=** ([MatchAllOfGeneric](#) const &)=delete
- **MatchAllOfGeneric** ([MatchAllOfGeneric](#) &&)=default
- **MatchAllOfGeneric** & **operator=** ([MatchAllOfGeneric](#) &&)=default
- **MatchAllOfGeneric** (MatcherTs const &... matchers)
- **MatchAllOfGeneric** (std::array< void const *, sizeof...(MatcherTs)> matchers)
- template<typename Arg >
bool **match** (Arg &&arg) const
- std::string **describe** () const override

Public Attributes

- std::array< void const *, sizeof...(MatcherTs)> **m_matchers**

Friends

- template<typename... MatchersRHS>
[MatchAllOfGeneric](#)< MatcherTs..., MatchersRHS... > **operator&&** ([MatchAllOfGeneric](#)< MatcherTs... > &&lhs, [MatchAllOfGeneric](#)< MatchersRHS... > &&rhs)
Avoids type nesting for GenericAllOf && GenericAllOf case.
- template<typename MatcherRHS >
std::enable_if_t< is_matcher< MatcherRHS >::value, [MatchAllOfGeneric](#)< MatcherTs..., MatcherRHS > > **operator&&** ([MatchAllOfGeneric](#)< MatcherTs... > &&lhs, MatcherRHS const &rhs)
Avoids type nesting for GenericAllOf && some matcher case.
- template<typename MatcherLHS >
std::enable_if_t< is_matcher< MatcherLHS >::value, [MatchAllOfGeneric](#)< MatcherLHS, MatcherTs... > > **operator&&** (MatcherLHS const &lhs, [MatchAllOfGeneric](#)< MatcherTs... > &&rhs)
Avoids type nesting for some matcher && GenericAllOf case.

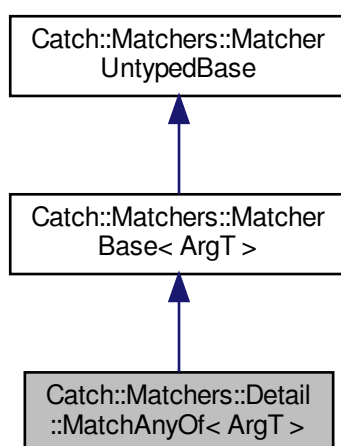
Additional Inherited Members

The documentation for this class was generated from the following file:

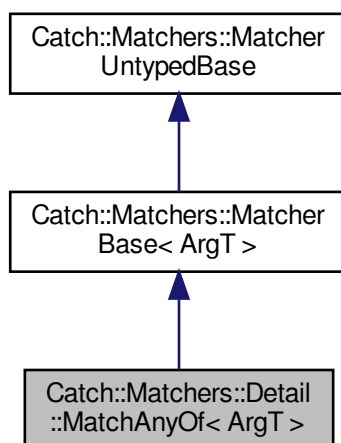
- include/catch2/[catch_amalgamated.hpp](#)

5.151 Catch::Matchers::Detail::MatchAnyOf< ArgT > Class Template Reference

Inheritance diagram for Catch::Matchers::Detail::MatchAnyOf< ArgT >:



Collaboration diagram for Catch::Matchers::Detail::MatchAnyOf< ArgT >:



Public Member Functions

- **MatchAnyOf** ([MatchAnyOf](#) const &)=delete
- [MatchAnyOf](#) & **operator=** ([MatchAnyOf](#) const &)=delete
- **MatchAnyOf** ([MatchAnyOf](#) &&)=default
- [MatchAnyOf](#) & **operator=** ([MatchAnyOf](#) &&)=default
- bool **match** (ArgT const &arg) const override
- std::string **describe** () const override

Friends

- [MatchAnyOf](#) **operator||** ([MatchAnyOf](#) &&lhs, [MatcherBase](#)< ArgT > const &rhs)
- [MatchAnyOf](#) **operator||** ([MatcherBase](#)< ArgT > const &lhs, [MatchAnyOf](#) &&rhs)

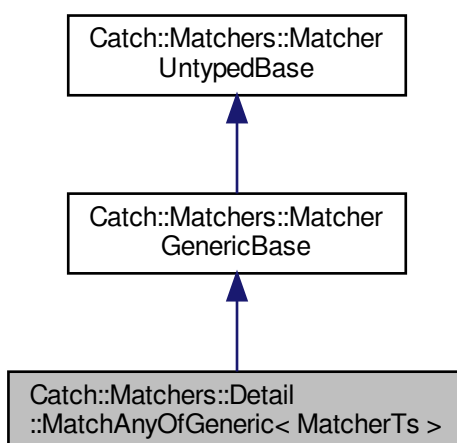
Additional Inherited Members

The documentation for this class was generated from the following file:

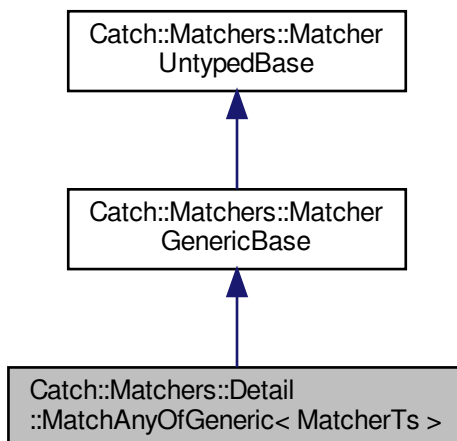
- include/catch2/[catch_amalgamated.hpp](#)

5.152 Catch::Matchers::Detail::MatchAnyOfGeneric< MatcherTs > Class Template Reference

Inheritance diagram for Catch::Matchers::Detail::MatchAnyOfGeneric< MatcherTs >:



Collaboration diagram for Catch::Matchers::Detail::MatchAnyOfGeneric< MatcherTs >:



Public Member Functions

- **MatchAnyOfGeneric** ([MatchAnyOfGeneric](#) const &)=delete
- **MatchAnyOfGeneric** & **operator=** ([MatchAnyOfGeneric](#) const &)=delete
- **MatchAnyOfGeneric** ([MatchAnyOfGeneric](#) &&)=default
- **MatchAnyOfGeneric** & **operator=** ([MatchAnyOfGeneric](#) &&)=default
- **MatchAnyOfGeneric** (MatcherTs const &... matchers)
- **MatchAnyOfGeneric** (std::array< void const *, sizeof...(MatcherTs)> matchers)
- template<typename Arg >
bool **match** (Arg &&arg) const
- std::string **describe** () const override

Public Attributes

- std::array< void const *, sizeof...(MatcherTs)> **m_matchers**

Friends

- template<typename... MatchersRHS>
[MatchAnyOfGeneric](#)< MatcherTs..., MatchersRHS... > **operator||** ([MatchAnyOfGeneric](#)< MatcherTs... > &&lhs, [MatchAnyOfGeneric](#)< MatchersRHS... > &&rhs)
Avoids type nesting for GenericAnyOf || GenericAnyOf case.
- template<typename MatcherRHS >
std::enable_if_t< is_matcher< MatcherRHS >::value, [MatchAnyOfGeneric](#)< MatcherTs..., MatcherRHS > > **operator||** ([MatchAnyOfGeneric](#)< MatcherTs... > &&lhs, MatcherRHS const &rhs)
Avoids type nesting for GenericAnyOf || some matcher case.
- template<typename MatcherLHS >
std::enable_if_t< is_matcher< MatcherLHS >::value, [MatchAnyOfGeneric](#)< MatcherLHS, MatcherTs... > > **operator||** (MatcherLHS const &lhs, [MatchAnyOfGeneric](#)< MatcherTs... > &&rhs)
Avoids type nesting for some matcher || GenericAnyOf case.

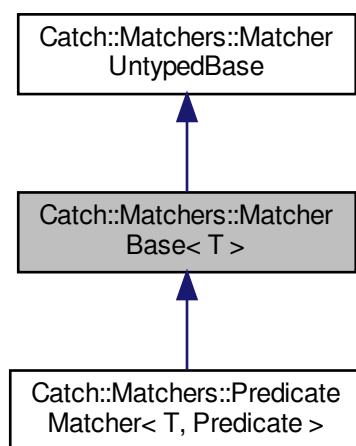
Additional Inherited Members

The documentation for this class was generated from the following file:

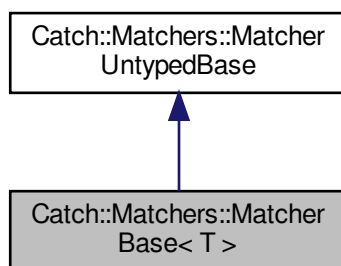
- [include/catch2/catch_amalgamated.hpp](#)

5.153 Catch::Matchers::MatcherBase< T > Class Template Reference

Inheritance diagram for Catch::Matchers::MatcherBase< T >:



Collaboration diagram for Catch::Matchers::MatcherBase< T >:



Public Member Functions

- virtual bool **match** (T const &arg) const =0

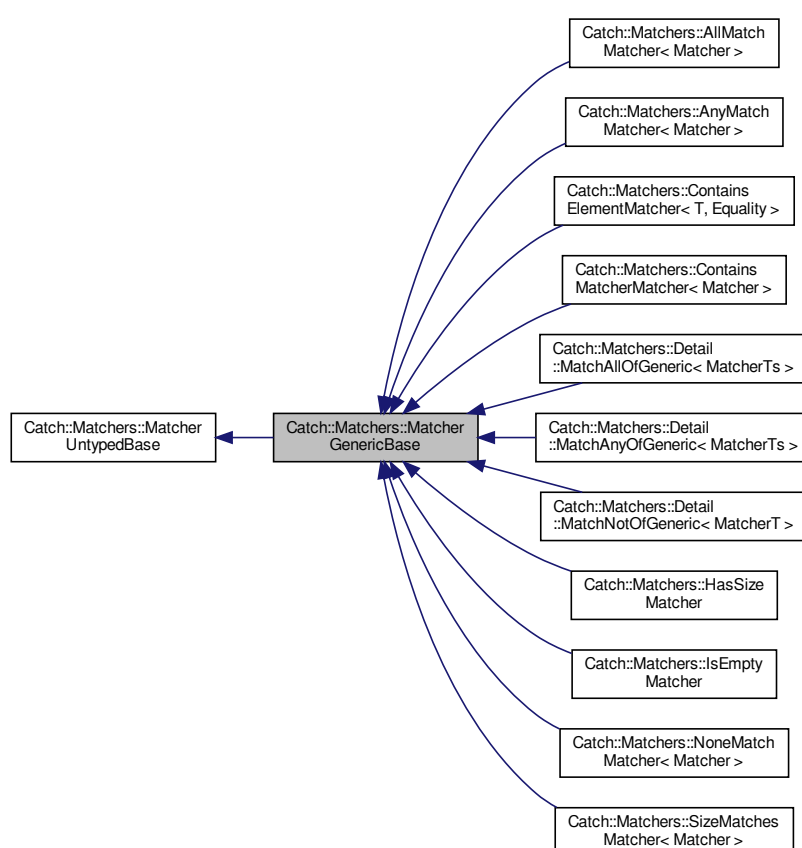
Additional Inherited Members

The documentation for this class was generated from the following file:

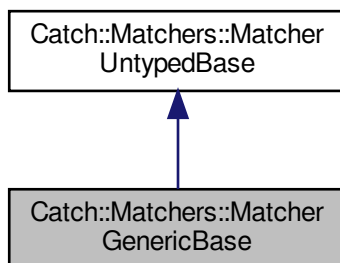
- [include/catch2/catch_amalgamated.hpp](#)

5.154 Catch::Matchers::MatcherGenericBase Class Reference

Inheritance diagram for Catch::Matchers::MatcherGenericBase:



Collaboration diagram for Catch::Matchers::MatcherGenericBase:



Public Member Functions

- **MatcherGenericBase** ([MatcherGenericBase](#) &)=default
- **MatcherGenericBase** ([MatcherGenericBase](#) &&)=default
- [MatcherGenericBase](#) & **operator=** ([MatcherGenericBase](#) const &)=delete
- [MatcherGenericBase](#) & **operator=** ([MatcherGenericBase](#) &&)=delete

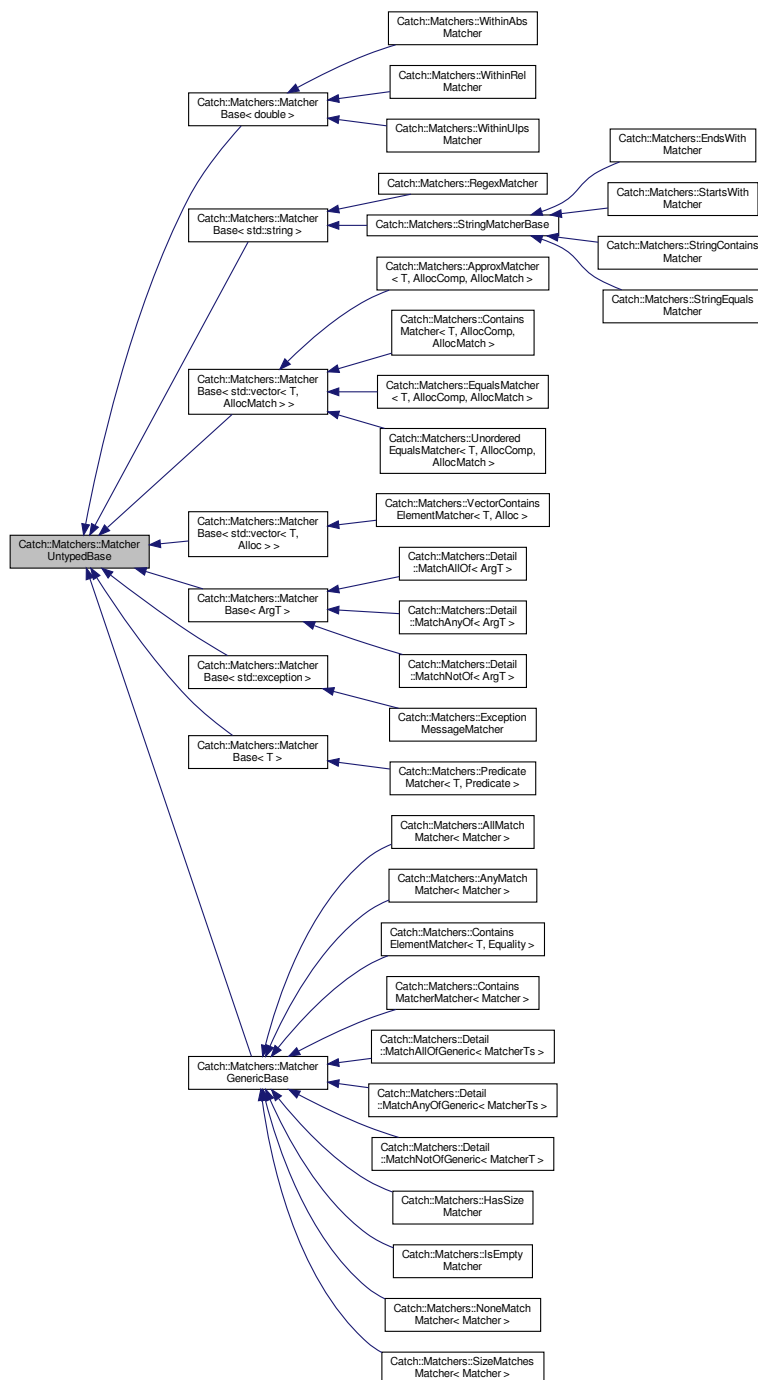
Additional Inherited Members

The documentation for this class was generated from the following file:

- include/catch2/[catch_amalgamated.hpp](#)

5.155 Catch::Matchers::MatcherUntypedBase Class Reference

Inheritance diagram for Catch::Matchers::MatcherUntypedBase:



Public Member Functions

- **MatcherUntypedBase** ([MatcherUntypedBase](#) const &)=default
- **MatcherUntypedBase** ([MatcherUntypedBase](#) &&)=default

- [MatcherUntypedBase](#) & **operator=** ([MatcherUntypedBase](#) const &)=delete
- [MatcherUntypedBase](#) & **operator=** ([MatcherUntypedBase](#) &&)=delete
- std::string **toString** () const

Protected Member Functions

- virtual std::string **describe** () const =0

Protected Attributes

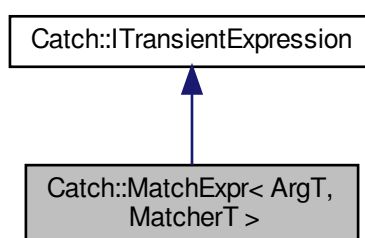
- std::string **m_cachedToString**

The documentation for this class was generated from the following file:

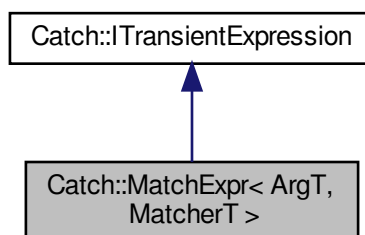
- include/catch2/[catch_amalgamated.hpp](#)

5.156 Catch::MatchExpr< ArgT, MatcherT > Class Template Reference

Inheritance diagram for Catch::MatchExpr< ArgT, MatcherT >:



Collaboration diagram for Catch::MatchExpr< ArgT, MatcherT >:



Public Member Functions

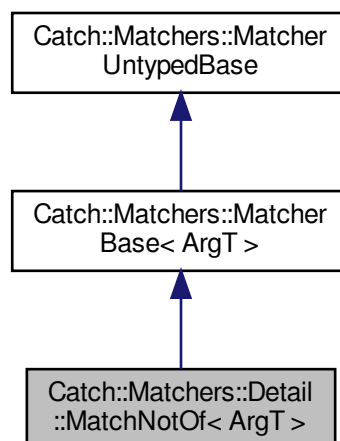
- **MatchExpr** (ArgT &&arg, MatcherT const &matcher, [StringRef](#) matcherString)
- void **streamReconstructedExpression** (std::ostream &os) const override

The documentation for this class was generated from the following file:

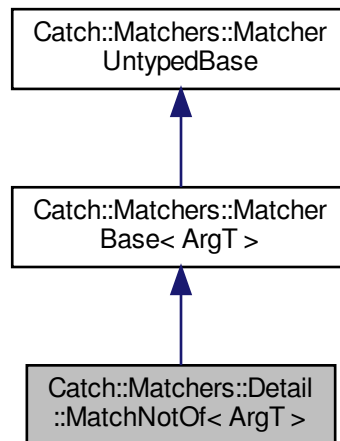
- include/catch2/[catch_amalgamated.hpp](#)

5.157 Catch::Matchers::Detail::MatchNotOf< ArgT > Class Template Reference

Inheritance diagram for Catch::Matchers::Detail::MatchNotOf< ArgT >:



Collaboration diagram for `Catch::Matchers::Detail::MatchNotOf< ArgT >`:



Public Member Functions

- **MatchNotOf** ([MatcherBase](#)< ArgT > const &underlyingMatcher)
- **match** (ArgT const &arg) const override
- **describe** () const override

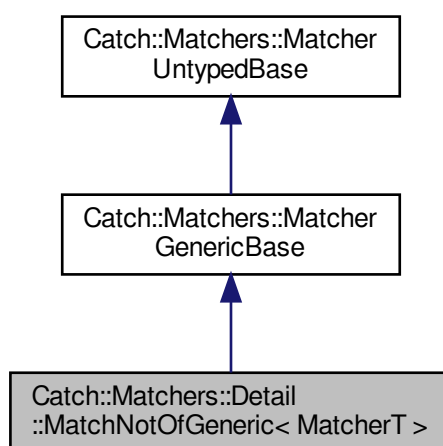
Additional Inherited Members

The documentation for this class was generated from the following file:

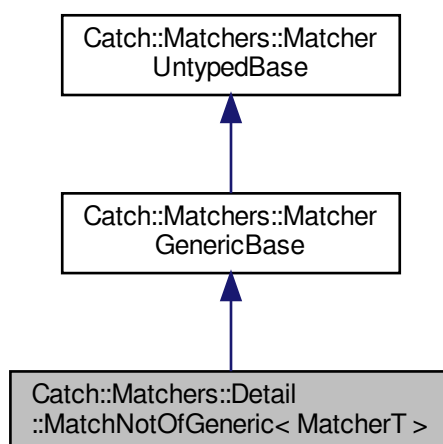
- `include/catch2/catch_amalgamated.hpp`

5.158 Catch::Matchers::Detail::MatchNotOfGeneric< MatcherT > Class Template Reference

Inheritance diagram for Catch::Matchers::Detail::MatchNotOfGeneric< MatcherT >:



Collaboration diagram for Catch::Matchers::Detail::MatchNotOfGeneric< MatcherT >:



Public Member Functions

- `MatchNotOfGeneric` (`MatchNotOfGeneric` const &)=delete

- [MatchNotOfGeneric](#) & **operator=** ([MatchNotOfGeneric](#) const &)=delete
- **MatchNotOfGeneric** ([MatchNotOfGeneric](#) &&)=default
- [MatchNotOfGeneric](#) & **operator=** ([MatchNotOfGeneric](#) &&)=default
- **MatchNotOfGeneric** (MatcherT const &matcher)
- template<typename Arg >
bool **match** (Arg &&arg) const
- std::string **describe** () const override

Friends

- MatcherT const & **operator!** ([MatchNotOfGeneric](#)< MatcherT > const &matcher)
Negating negation can just unwrap and return underlying matcher.

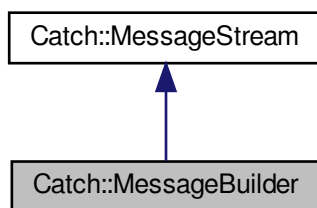
Additional Inherited Members

The documentation for this class was generated from the following file:

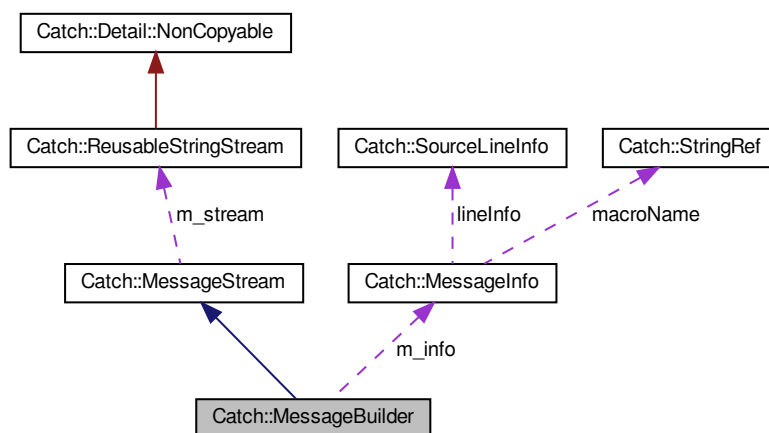
- include/catch2/[catch_amalgamated.hpp](#)

5.159 Catch::MessageBuilder Struct Reference

Inheritance diagram for Catch::MessageBuilder:



Collaboration diagram for Catch::MessageBuilder:



Public Member Functions

- **MessageBuilder** ([StringRef](#) macroName, [SourceLineInfo](#) const &lineInfo, ResultWas::OfType type)
- `template<typename T >`
[MessageBuilder](#) & **operator**<< (T const &value)

Public Attributes

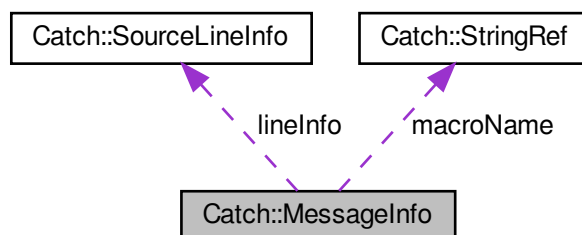
- [MessageInfo](#) `m_info`

The documentation for this struct was generated from the following file:

- include/catch2/[catch_amalgamated.hpp](#)

5.160 Catch::MessageInfo Struct Reference

Collaboration diagram for Catch::MessageInfo:



Public Member Functions

- **MessageInfo** ([StringRef](#) _macroName, [SourceLineInfo](#) const &_lineInfo, ResultWas::OfType _type)
- bool **operator==** ([MessageInfo](#) const &other) const
- bool **operator<** ([MessageInfo](#) const &other) const

Public Attributes

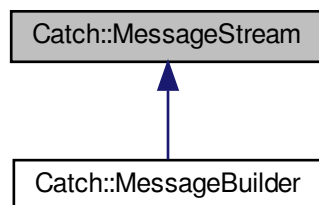
- [StringRef](#) **macroName**
- std::string **message**
- [SourceLineInfo](#) **lineInfo**
- ResultWas::OfType **type**
- unsigned int **sequence**

The documentation for this struct was generated from the following file:

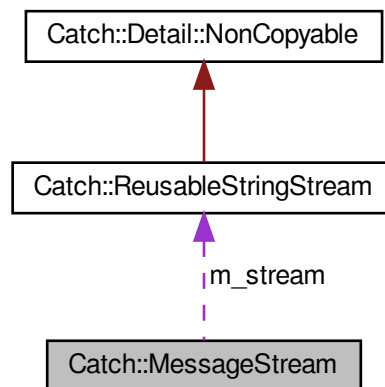
- include/catch2/[catch_amalgamated.hpp](#)

5.161 Catch::MessageStream Struct Reference

Inheritance diagram for Catch::MessageStream:



Collaboration diagram for Catch::MessageStream:



Public Member Functions

- `template<typename T >`
`MessageStream` & `operator<< (T const &value)`

Public Attributes

- `ReusableStringStream m_stream`

The documentation for this struct was generated from the following file:

- `include/catch2/catch_amalgamated.hpp`

5.162 Model< TSeq > Class Template Reference

Core class of epiworld.

```
#include <model-bones.hpp>
```

Public Member Functions

- [DataBase](#)< TSeq > & **get_db** ()
- epiworld_double & **operator()** (std::string pname)
- size_t **size** () const
- size_t **get_n_variants** () const
- size_t **get_n_tools** () const
- unsigned int **get_ndays** () const
- unsigned int **get_n_replicates** () const
- void **set_ndays** (unsigned int ndays)
- bool **get_verbose** () const
- void **verbose_off** ()
- void **verbose_on** ()
- int [today](#) () const
The current time of the model.
- void [write_data](#) (std::string fn_variant_info, std::string fn_variant_hist, std::string fn_tool_info, std::string fn_tool_hist, std::string fn_total_hist, std::string fn_transmission, std::string fn_transition) const
Wrapper of DataBase::write_data
- std::map< std::string, epiworld_double > & **params** ()
- void [reset](#) ()
Reset the model.
- void **print** () const
- [Model](#)< TSeq > && **clone** () const
- void **get_elapsed** (std::string unit="auto", epiworld_double *last_elapsed=nullptr, epiworld_double *total_elapsed=nullptr, std::string *unit_abbr=nullptr, bool print=true) const
- void [add_global_action](#) (std::function< void([Model](#)< TSeq > *)> fun, int date=-99)
Set a global action.
- void **run_global_actions** ()
- void **clear_status_set** ()
- const std::vector< VirusPtr< TSeq > > & **get_viruses** () const
- const std::vector< ToolPtr< TSeq > > & **get_tools** () const

Set the backup object

backup can be used to restore the entire object after a run. This can be useful if the user wishes to have individuals start with the same network from the beginning.

- void **set_backup** ()
- void **restore_backup** ()

Random number generation

Parameters

eng	<i>Random number generator</i>
s	<i>Seed</i>

- void **set_rand_engine** (std::mt19937 &eng)
- std::mt19937 * **get_rand_engine** ()
- void **seed** (unsigned int s)
- void **set_rand_gamma** (epiworld_double alpha, epiworld_double beta)
- epiworld_double **runif** ()
- epiworld_double **rnorm** ()
- epiworld_double **rnorm** (epiworld_double mean, epiworld_double sd)

- `epiworld_double rgamma ()`
- `epiworld_double rgamma (epiworld_double alpha, epiworld_double beta)`

Add Virus/Tool to the model

This is done before the model has been initialized.

Parameters

v	<i>Virus to be added</i>
t	<i>Tool to be added</i>
preval	<i>Initial prevalence (initial state.) It can be specified as a proportion (between zero and one,) or an integer indicating number of individuals.</i>

- `void add_virus (Virus< TSeq > v, epiworld_double preval)`
- `void add_virus_n (Virus< TSeq > v, unsigned int preval)`
- `void add_tool (Tool< TSeq > t, epiworld_double preval)`
- `void add_tool_n (Tool< TSeq > t, unsigned int preval)`

Accessing population of the model

Parameters

fn	<i>std::string Filename of the edgelist file.</i>
skip	<i>int Number of lines to skip in fn.</i>
directed	<i>bool Whether the graph is directed or not.</i>
size	<i>Size of the network.</i>
al	<i>AdjList to read into the model.</i>

- `void agents_from_adjlist (std::string fn, int size, int skip=0, bool directed=false)`
- `void agents_from_adjlist (AdjList al)`
- `bool is_directed () const`
- `std::vector< Agent< TSeq > > * get_agents ()`
- `void agents_smallworld (unsigned int n=1000, unsigned int k=5, bool d=false, epiworld_double p=.01)`

Functions to run the model

Parameters

seed	<i>Seed to be used for Pseudo-RNG.</i>
ndays	<i>Number of days (steps) of the simulation.</i>
fun	<i>In the case of run_multiple, a function that is called after each experiment.</i>

- `void init (unsigned int ndays, unsigned int seed)`
- `void update_status ()`
- `void mutate_variant ()`
- `void next ()`
- `void run ()`
Runs the simulation (after initialization)
- `void run_multiple (unsigned int nexperiments, std::function< void(size_t, Model< TSeq > *)> fun=save←_run< TSeq >(), bool reset=true, bool verbose=true)`

Rewire the network preserving the degree sequence.

This implementation assumes an undirected network, thus if $\{(i,j), (k,l)\} \rightarrow \{(i,l), (k,j)\}$, the reciprocal is also true, i.e., $\{(j,i), (l,k)\} \rightarrow \{(j,k), (l,i)\}$.

Parameters

proportion	Proportion of ties to be rewired.
------------	-----------------------------------

Returns

A rewired version of the network.

- void **set_rewire_fun** (std::function< void(std::vector< [Agent](#)< TSeq >> *, [Model](#)< TSeq > *, epiworld_double)> fun)
- void **set_rewire_prop** (epiworld_double prop)
- epiworld_double **get_rewire_prop** () const
- void **rewire** ()

Export the network data in edgelist form

Parameters

fn	std::string. File name.
source	Integer vector
target	Integer vector

When passing the source and target, the function will write the edgelist on those.

- void **write_edgelist** (std::string fn) const
- void **write_edgelist** (std::vector< unsigned int > &source, std::vector< unsigned int > &target) const

Manage status (states) in the model

The functions `get_status` return the current values for the statuses included in the model.

Parameters

lab	std::string Name of the status.
-----	---------------------------------

Returns

`add_status*` returns nothing.
`get_status*` returns a vector of pairs with the statuses and their labels.

- void **add_status** (std::string lab, UpdateFun< TSeq > fun=nullptr)
- const std::vector< std::string > & **get_status** () const
- const std::vector< UpdateFun< TSeq > > & **get_status_fun** () const
- void **print_status_codes** () const

Set the user data object

Parameters

names	string vector with the names of the variables.
-------	--

- void **set_user_data** (std::vector< std::string > names)

- void **add_user_data** (unsigned int j, epiworld_double x)
- void **add_user_data** (std::vector< epiworld_double > x)
- [UserData](#)< TSeq > & **get_user_data** ()

Queuing system

When queueing is on, the model will keep track of which agents are either in risk of exposure or exposed. This then is used at each step to act only on the aforementioned agents.

- void [queuing_on](#) ()
Activates the queuing system (default.)
- void [queuing_off](#) ()
Deactivates the queuing system.
- bool [is_queuing_on](#) () const
Query if the queuing system is on.
- [Queue](#)< TSeq > & [get_queue](#) ()
Retrieve the [Queue](#) object.

Get the susceptibility reduction object

Parameters

v	
---	--

Returns

epiworld_double

- void **set_susceptibility_reduction_mixer** (MixerFun< TSeq > fun)
- void **set_transmission_reduction_mixer** (MixerFun< TSeq > fun)
- void **set_recovery_enhancer_mixer** (MixerFun< TSeq > fun)
- void **set_death_reduction_mixer** (MixerFun< TSeq > fun)

Friends

- class **Agent**< TSeq >
- class **Agents**< TSeq >
- class **DataBase**< TSeq >
- class **Queue**< TSeq >

Tool Mixers

These functions combine the effects tools have to deliver a single effect. For example, wearing a mask, been vaccinated, and the immune system combine together to jointly reduce the susceptibility for a given virus.

- std::vector< epiworld_double > **array_double_tmp**
- std::vector< [Virus](#)< TSeq > * > **array_virus_tmp**
- **Model** ()
- **Model** (const [Model](#)< TSeq > &m)
- **Model** ([Model](#)< TSeq > &&m)
- [Model](#)< TSeq > & **operator=** (const [Model](#)< TSeq > &m)
- void **clone_population** (std::vector< [Agent](#)< TSeq > > &p, bool &d, [Model](#)< TSeq > *m=nullptr) const
- void **clone_population** (const [Model](#)< TSeq > &m)

Setting and accessing parameters from the model

[Tools](#) can incorporate parameters included in the model. Internally, parameters in the tool are stored as pointers to an `std::map<>` of parameters in the model. Using the `unsigned int` method directly fetches the parameters in the order these were added to the tool. Accessing parameters via the `std::string` method involves searching the parameter directly in the `std::map<>` member of the model (so it is not recommended.)

The `par()` function members are aliases for `get_param()`.

Parameters

<i>initial_val</i>	
<i>pname</i>	Name of the parameter to add or to fetch

Returns

The current value of the parameter in the model.

- `epiworld_double * p0`
- `epiworld_double * p1`
- `epiworld_double * p2`
- `epiworld_double * p3`
- `epiworld_double * p4`
- `epiworld_double * p5`
- `epiworld_double * p6`
- `epiworld_double * p7`
- `epiworld_double * p8`
- `epiworld_double * p9`
- `epiworld_double * p10`
- `epiworld_double * p11`
- `epiworld_double * p12`
- `epiworld_double * p13`
- `epiworld_double * p14`
- `epiworld_double * p15`
- `epiworld_double * p16`
- `epiworld_double * p17`
- `epiworld_double * p18`
- `epiworld_double * p19`
- `epiworld_double * p20`
- `epiworld_double * p21`
- `epiworld_double * p22`
- `epiworld_double * p23`
- `epiworld_double * p24`
- `epiworld_double * p25`
- `epiworld_double * p26`
- `epiworld_double * p27`
- `epiworld_double * p28`
- `epiworld_double * p29`
- `epiworld_double * p30`
- `epiworld_double * p31`
- `epiworld_double * p32`
- `epiworld_double * p33`
- `epiworld_double * p34`

- `epiworld_double * p35`
- `epiworld_double * p36`
- `epiworld_double * p37`
- `epiworld_double * p38`
- `epiworld_double * p39`
- `unsigned int npar_used = 0u`
- `epiworld_double add_param` (`epiworld_double initial_val`, `std::string pname`)
- `epiworld_double get_param` (`unsigned int k`)
- `epiworld_double get_param` (`std::string pname`)
- `epiworld_double par` (`unsigned int k`)
- `epiworld_double par` (`std::string pname`)

5.162.1 Detailed Description

```
template<typename TSeq = int>
class Model< TSeq >
```

Core class of epiworld.

The model class provides the wrapper that puts together [Agent](#), [Virus](#), and [Tools](#).

Template Parameters

<i>TSeq</i>	Type of sequence. In principle, users can build models in which virus and human sequence is represented as numeric vectors (if needed.)
-------------	---

5.162.2 Member Function Documentation

5.162.2.1 add_global_action()

```
template<typename TSeq = int>
void Model< TSeq >::add_global_action (
    std::function< void(Model< TSeq > *)> fun,
    int date = -99 )
```

Set a global action.

Parameters

<i>fun</i>	A function to be called on the prescribed dates
<i>date</i>	Integer indicating when the function is called (see details)

When date is less than zero, then the function is called at the end of every day. Otherwise, the function will be called only at the end of the indicated date.

5.162.2.2 reset()

```
template<typename TSeq = int>
void Model< TSeq >::reset ( )
```

Reset the model.

Resetting the model will:

- clear the database
- restore the population (if `set_backup()` was called before)
- re-distribute tools
- re-distribute viruses
- set the date to 0

5.162.2.3 run_multiple()

```
template<typename TSeq = int>
void Model< TSeq >::run_multiple (
    unsigned int nexperiments,
    std::function< void(size_t, Model< TSeq > *)> fun = save_run< TSeq >(),
    bool reset = true,
    bool verbose = true )
```

Parameters

<i>nexperiments</i>	Multiple runs of the simulation
---------------------	---------------------------------

5.162.2.4 write_data()

```
template<typename TSeq = int>
void Model< TSeq >::write_data (
    std::string fn_variant_info,
    std::string fn_variant_hist,
    std::string fn_tool_info,
    std::string fn_tool_hist,
    std::string fn_total_hist,
    std::string fn_transmission,
    std::string fn_transition ) const
```

Wrapper of `DataBase::write_data`

Parameters

<i>fn_variant_info</i>	Filename. Information about the variant.
------------------------	--

Parameters

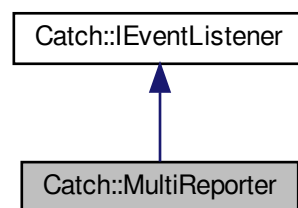
<i>fn_variant_hist</i>	Filename. History of the variant.
<i>fn_tool_info</i>	Filename. Information about the tool.
<i>fn_tool_hist</i>	Filename. History of the tool.
<i>fn_total_hist</i>	Filename. Aggregated history (status)
<i>fn_transmission</i>	Filename. Transmission history.
<i>fn_transition</i>	Filename. Markov transition history.

The documentation for this class was generated from the following files:

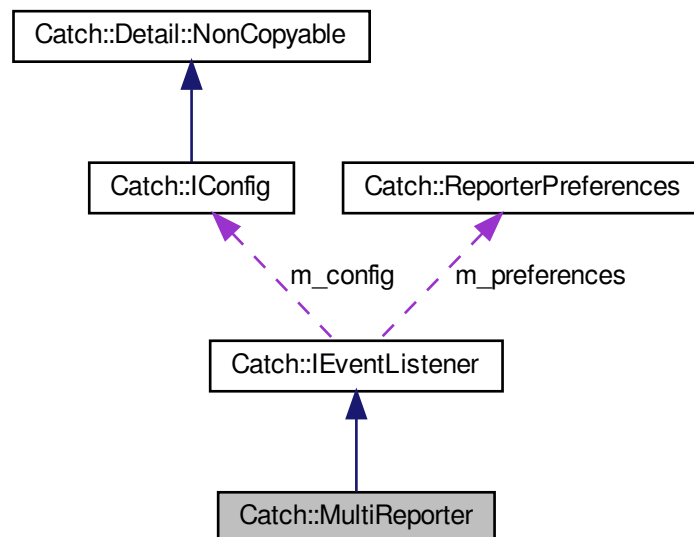
- include/epiworld/agent-meat-status.hpp
- include/epiworld/model-bones.hpp

5.163 Catch::MultiReporter Class Reference

Inheritance diagram for Catch::MultiReporter:



Collaboration diagram for Catch::MultiReporter:



Public Member Functions

- void **addListener** (IEventListenerPtr &&listener)
- void **addReporter** (IEventListenerPtr &&reporter)
- void **noMatchingTestCases** (StringRef unmatchedSpec) override
Called when no test cases match provided test spec.
- void **fatalErrorEncountered** (StringRef error) override
Called if a fatal error (signal/structured exception) occurred.
- void **reportInvalidTestSpec** (StringRef arg) override
Called for all invalid test specs from the cli.
- void **benchmarkPreparing** (StringRef name) override
Called when user-code is being probed before the actual benchmark runs.
- void **benchmarkStarting** (BenchmarkInfo const &benchmarkInfo) override
Called after probe but before the user-code is being benchmarked.
- void **benchmarkEnded** (BenchmarkStats<> const &benchmarkStats) override
Called with the benchmark results if benchmark successfully finishes.
- void **benchmarkFailed** (StringRef error) override
Called if running the benchmarks fails for any reason.
- void **testRunStarting** (TestRunInfo const &testRunInfo) override
- void **testCaseStarting** (TestCaseInfo const &testInfo) override
Called once for each TEST_CASE, no matter how many times it is entered.
- void **testCasePartialStarting** (TestCaseInfo const &testInfo, uint64_t partNumber) override
Called every time a TEST_CASE is entered, including repeats (due to sections)
- void **sectionStarting** (SectionInfo const §ionInfo) override
Called when a SECTION is being entered. Not called for skipped sections.
- void **assertionStarting** (AssertionInfo const &assertionInfo) override

- *Called before assertion success/failure is evaluated.*
- void [assertionEnded](#) ([AssertionStats](#) const &assertionStats) override
Called after assertion was fully evaluated.
- void [sectionEnded](#) ([SectionStats](#) const §ionStats) override
Called after a `SECTION` has finished running.
- void [testCasePartialEnded](#) ([TestCaseStats](#) const &testInfo, uint64_t partNumber) override
Called every time a `TEST_CASE` is entered, including repeats (due to sections)
- void [testCaseEnded](#) ([TestCaseStats](#) const &testCaseStats) override
Called once for each `TEST_CASE`, no matter how many times it is entered.
- void [testRunEnded](#) ([TestRunStats](#) const &testRunStats) override
- void [skipTest](#) ([TestCaseInfo](#) const &testInfo) override
Called with test cases that are skipped due to the test run aborting.
- void [listReporters](#) (std::vector< [ReporterDescription](#) > const &descriptions) override
Writes out information about provided reporters using reporter-specific format.
- void [listListeners](#) (std::vector< [ListenerDescription](#) > const &descriptions) override
Writes out the provided listeners descriptions using reporter-specific format.
- void [listTests](#) (std::vector< [TestCaseHandle](#) > const &tests) override
Writes out information about provided tests using reporter-specific format.
- void [listTags](#) (std::vector< [TagInfo](#) > const &tags) override
Writes out information about the provided tags using reporter-specific format.
- [IEventListener](#) ([IConfig](#) const *config)

Additional Inherited Members

5.163.1 Member Function Documentation

5.163.1.1 testRunEnded()

```
void Catch::MultiReporter::testRunEnded (
    TestRunStats const & testRunStats ) [override], [virtual]
```

Called once after all tests in a testing run are finished

Not called if tests weren't run (e.g. only listings happened)

Implements [Catch::IEventListener](#).

5.163.1.2 testRunStarting()

```
void Catch::MultiReporter::testRunStarting (
    TestRunInfo const & testRunInfo ) [override], [virtual]
```

Called once in a testing run before tests are started

Not called if tests won't be run (e.g. only listing will happen)

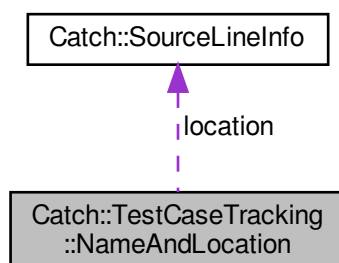
Implements [Catch::IEventListener](#).

The documentation for this class was generated from the following file:

- include/catch2/catch_amalgamated.hpp

5.164 Catch::TestCaseTracking::NameAndLocation Struct Reference

Collaboration diagram for Catch::TestCaseTracking::NameAndLocation:



Public Member Functions

- **NameAndLocation** (std::string const &_name, [SourceLineInfo](#) const &_location)

Public Attributes

- std::string **name**
- [SourceLineInfo](#) **location**

Friends

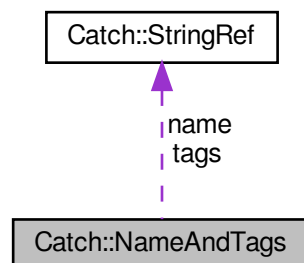
- bool **operator==** ([NameAndLocation](#) const &lhs, [NameAndLocation](#) const &rhs)

The documentation for this struct was generated from the following file:

- include/catch2/[catch_amalgamated.hpp](#)

5.165 Catch::NameAndTags Struct Reference

Collaboration diagram for Catch::NameAndTags:



Public Member Functions

- constexpr **NameAndTags** ([StringRef](#) name_₌[StringRef](#)(), [StringRef](#) tags_₌[StringRef](#)()) noexcept

Public Attributes

- [StringRef](#) name
- [StringRef](#) tags

The documentation for this struct was generated from the following file:

- include/catch2/[catch_amalgamated.hpp](#)

5.166 Catch::CumulativeReporterBase::Node< T, ChildNodeT > Struct Template Reference

Public Types

- using **ChildNodes** = std::vector< [Detail::unique_ptr](#)< ChildNodeT > >

Public Member Functions

- **Node** (T const &_value)

Public Attributes

- **T value**
- ChildNodes **children**

The documentation for this struct was generated from the following file:

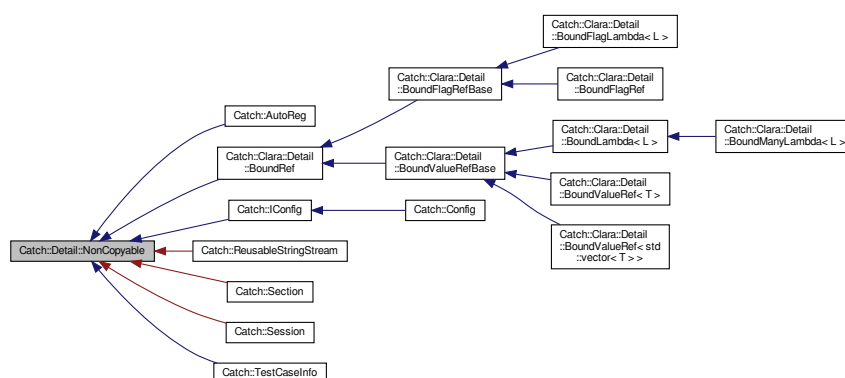
- include/catch2/catch_amalgamated.hpp

5.167 Catch::Detail::NonCopyable Class Reference

Deriving classes become noncopyable and nonmovable.

```
#include <catch_amalgamated.hpp>
```

Inheritance diagram for Catch::Detail::NonCopyable:



5.167.1 Detailed Description

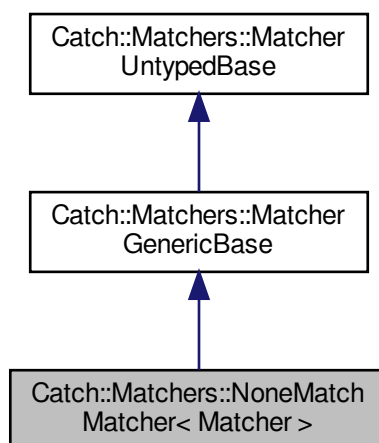
Deriving classes become noncopyable and nonmovable.

The documentation for this class was generated from the following file:

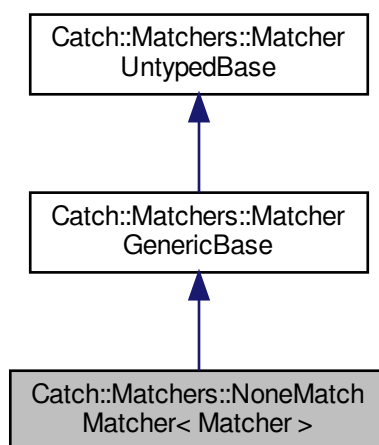
- include/catch2/catch_amalgamated.hpp

5.168 Catch::Matchers::NoneMatcher< Matcher > Class Template Reference

Inheritance diagram for Catch::Matchers::NoneMatcher< Matcher >:



Collaboration diagram for Catch::Matchers::NoneMatcher< Matcher >:



Public Member Functions

- **NoneMatcher** (Matcher matcher)
- `std::string describe ()` const override
- `template<typename RangeLike >`
`bool match (RangeLike &&rng)` const

Additional Inherited Members

The documentation for this class was generated from the following file:

- include/catch2/[catch_amalgamated.hpp](#)

5.169 Catch::Benchmark::now< Clock > Struct Template Reference

Public Member Functions

- TimePoint< Clock > **operator()** () const

The documentation for this struct was generated from the following file:

- include/catch2/[catch_amalgamated.hpp](#)

5.170 Catch::Benchmark::Detail::ObjectStorage< T, Destruct > Struct Template Reference

Public Member Functions

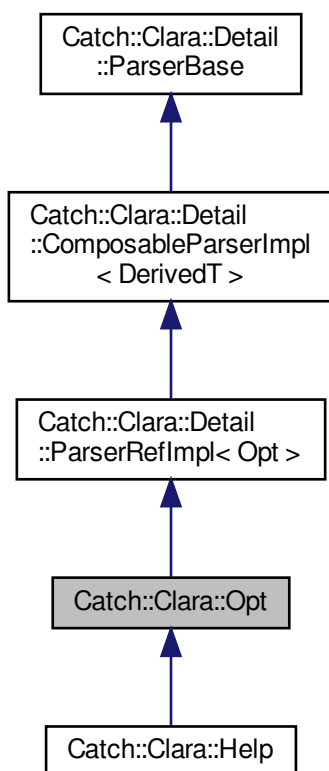
- **ObjectStorage** (const [ObjectStorage](#) &other)
- **ObjectStorage** ([ObjectStorage](#) &&other)
- template<typename... Args>
void **construct** (Args &&... args)
- template<bool AllowManualDestruction = !Destruct>
std::enable_if_t< AllowManualDestruction > **destruct** ()

The documentation for this struct was generated from the following file:

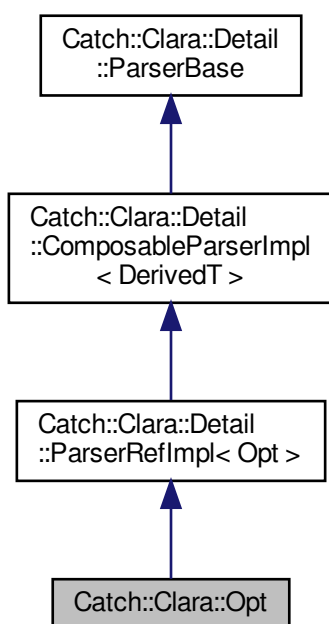
- include/catch2/[catch_amalgamated.hpp](#)

5.171 Catch::Clara::Opt Class Reference

Inheritance diagram for Catch::Clara::Opt:



Collaboration diagram for Catch::Clara::Opt:



Public Member Functions

- `template<typename LambdaT > Opt (LambdaT const &ref)`
- `Opt (bool &ref)`
- `template<typename LambdaT , typename = typename std::enable_if_t< Detail::is_unary_function<LambdaT>::value>> Opt (LambdaT const &ref, std::string const &hint)`
- `template<typename LambdaT > Opt (accept_many_t, LambdaT const &ref, std::string const &hint)`
- `template<typename T , typename = typename std::enable_if_t< !Detail::is_unary_function<T>::value>> Opt (T &ref, std::string const &hint)`
- `auto operator[] (std::string const &optName) -> Opt &`
- `std::vector< Detail::HelpColumns > getHelpColumns () const`
- `bool isMatch (std::string const &optToken) const`
- `Detail::InternalParseResult parse (std::string const &, Detail::TokenStream const &tokens) const override`
- `Detail::Result validate () const override`

Protected Attributes

- `std::vector< std::string > m_optNames`

Additional Inherited Members

The documentation for this class was generated from the following file:

- `include/catch2/catch_amalgamated.hpp`

5.172 Catch::Optional< T > Class Template Reference

Public Member Functions

- **Optional** (T const &_value)
- **Optional** ([Optional](#) const &_other)
- [Optional](#) & **operator=** ([Optional](#) const &_other)
- [Optional](#) & **operator=** (T const &_value)
- void **reset** ()
- T & **operator*** ()
- T const & **operator*** () const
- T * **operator->** ()
- const T * **operator->** () const
- T **valueOr** (T const &defaultValue) const
- bool **some** () const
- bool **none** () const
- bool **operator!** () const
- **operator bool** () const

Friends

- bool **operator==** ([Optional](#) const &a, [Optional](#) const &b)
- bool **operator!=** ([Optional](#) const &a, [Optional](#) const &b)

The documentation for this class was generated from the following file:

- include/catch2/[catch_amalgamated.hpp](#)

5.173 Catch::Benchmark::OutlierClassification Struct Reference

Public Member Functions

- int **total** () const

Public Attributes

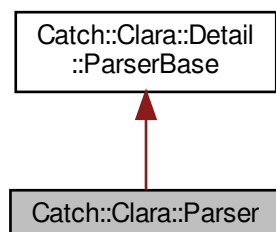
- int **samples_seen** = 0
- int **low_severe** = 0
- int **low_mild** = 0
- int **high_mild** = 0
- int **high_severe** = 0

The documentation for this struct was generated from the following file:

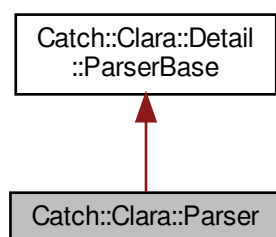
- include/catch2/[catch_amalgamated.hpp](#)

5.174 Catch::Clara::Parser Class Reference

Inheritance diagram for Catch::Clara::Parser:



Collaboration diagram for Catch::Clara::Parser:



Public Member Functions

- auto **operator**|= ([ExeName](#) const &exeName) -> [Parser](#) &
- auto **operator**|= ([Arg](#) const &arg) -> [Parser](#) &
- auto **operator**|= ([Opt](#) const &opt) -> [Parser](#) &
- [Parser](#) & **operator**|= ([Parser](#) const &other)
- template<typename T >
auto **operator**| (T const &other) const -> [Parser](#)
- std::vector< [Detail::HelpColumns](#) > **getHelpColumns** () const
- void **writeToStream** (std::ostream &os) const
- [Detail::Result](#) **validate** () const override
- [Detail::InternalParseResult](#) **parse** (std::string const &exeName, [Detail::TokenStream](#) const &tokens) const override

Friends

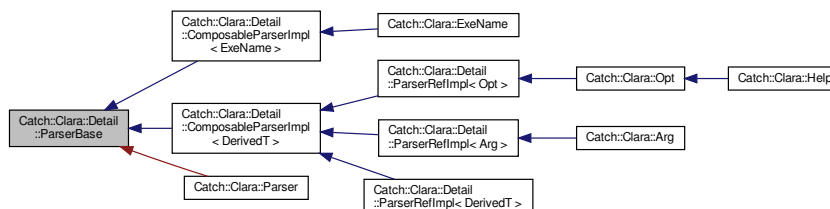
- auto **operator**<< (std::ostream &os, [Parser](#) const &parser) -> std::ostream &

The documentation for this class was generated from the following file:

- include/catch2/[catch_amalgamated.hpp](#)

5.175 Catch::Clara::Detail::ParserBase Class Reference

Inheritance diagram for Catch::Clara::Detail::ParserBase:



Public Member Functions

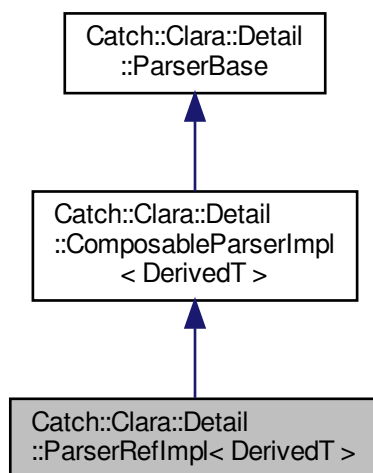
- virtual auto **validate** () const -> [Result](#)
- virtual auto **parse** (std::string const &exeName, [TokenStream](#) const &tokens) const -> [InternalParseResult](#)=0
- virtual size_t **cardinality** () const
- [InternalParseResult](#) **parse** ([Args](#) const &args) const

The documentation for this class was generated from the following file:

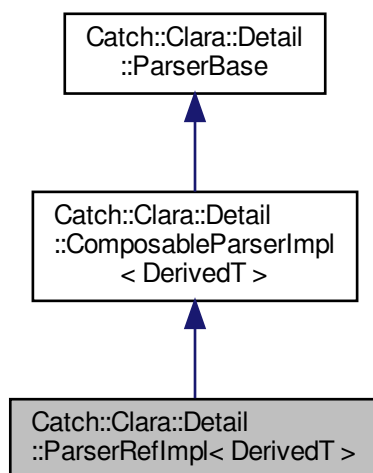
- include/catch2/[catch_amalgamated.hpp](#)

5.176 Catch::Clara::Detail::ParserRefImpl< DerivedT > Class Template Reference

Inheritance diagram for Catch::Clara::Detail::ParserRefImpl< DerivedT >:



Collaboration diagram for Catch::Clara::Detail::ParserRefImpl< DerivedT >:



Public Member Functions

- `template<typename LambdaT >`
ParserRefImpl ([accept_many_t](#), LambdaT const &ref, std::string const &hint)

- `template<typename T, typename = typename std::enable_if_t< !Detail::is_unary_function<T>::value>>`
ParserRefImpl (T &ref, std::string const &hint)
- `template<typename LambdaT, typename = typename std::enable_if_t< Detail::is_unary_function<LambdaT>::value>>`
ParserRefImpl (LambdaT const &ref, std::string const &hint)
- `auto operator()` (std::string const &description) -> DerivedT &
- `auto optional ()` -> DerivedT &
- `auto required ()` -> DerivedT &
- `auto isOptional ()` const -> bool
- `auto cardinality ()` const -> size_t override
- `std::string const & hint ()` const

Protected Member Functions

- **ParserRefImpl** (std::shared_ptr< [BoundRef](#) > const &ref)

Protected Attributes

- Optionality **m_optionality** = Optionality::Optional
- std::shared_ptr< [BoundRef](#) > **m_ref**
- std::string **m_hint**
- std::string **m_description**

The documentation for this class was generated from the following file:

- include/catch2/[catch_amalgamated.hpp](#)

5.177 Catch::Clara::Detail::ParseState Class Reference

Public Member Functions

- **ParseState** (ParseResultType type, [TokenStream](#) const &remainingTokens)
- ParseResultType **type** () const
- [TokenStream](#) const & **remainingTokens** () const

The documentation for this class was generated from the following file:

- include/catch2/[catch_amalgamated.hpp](#)

5.178 PersonTools< TSeq > Class Template Reference

The documentation for this class was generated from the following file:

- include/epiworld/config.hpp

5.179 Catch::pluralise Class Reference

```
#include <catch_amalgamated.hpp>
```

Public Member Functions

- constexpr **pluralise** (std::uint64_t count, [StringRef](#) label)

Friends

- std::ostream & **operator**<< (std::ostream &os, [pluralise](#) const &pluraliser)

5.179.1 Detailed Description

Helper for streaming a "count [maybe-plural-of-label]" human-friendly string

Usage example:

```
std::cout << "Found " << pluralise(count, "error") << '\n';
```

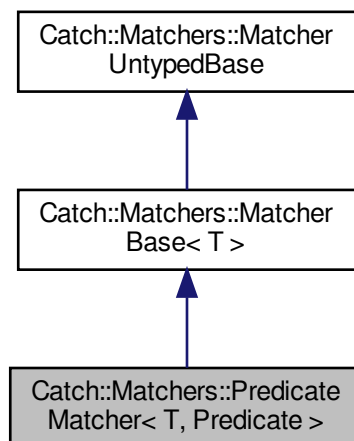
Important: The provided string must outlive the instance

The documentation for this class was generated from the following file:

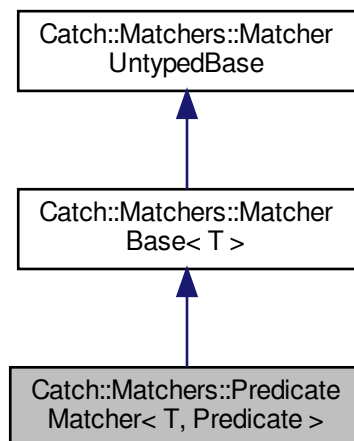
- include/catch2/[catch_amalgamated.hpp](#)

5.180 Catch::Matchers::PredicateMatcher< T, Predicate > Class Template Reference

Inheritance diagram for Catch::Matchers::PredicateMatcher< T, Predicate >:



Collaboration diagram for Catch::Matchers::PredicateMatcher< T, Predicate >:



Public Member Functions

- **PredicateMatcher** (Predicate &&elem, std::string const &descr)
- bool **match** (T const &item) const override
- std::string **describe** () const override

Additional Inherited Members

The documentation for this class was generated from the following file:

- include/catch2/catch_amalgamated.hpp

5.181 Catch::ProcessedReporterSpec Struct Reference

```
#include <catch_amalgamated.hpp>
```

Public Attributes

- std::string **name**
- std::string **outputFilename**
- [ColourMode](#) **colourMode**
- std::map< std::string, std::string > **customOptions**

Friends

- bool **operator==** ([ProcessedReporterSpec](#) const &lhs, [ProcessedReporterSpec](#) const &rhs)
- bool **operator!=** ([ProcessedReporterSpec](#) const &lhs, [ProcessedReporterSpec](#) const &rhs)

5.181.1 Detailed Description

[ReporterSpec](#) but with the defaults filled in.

Like [ReporterSpec](#), the semantics are unchecked.

The documentation for this struct was generated from the following file:

- include/catch2/catch_amalgamated.hpp

5.182 Progress Class Reference

A simple progress bar.

```
#include <progress.hpp>
```

Public Member Functions

- **Progress** (int n_, int width_)
- void **start** ()
- void **next** ()
- void **end** ()

5.182.1 Detailed Description

A simple progress bar.

The documentation for this class was generated from the following file:

- include/epiworld/progress.hpp

5.183 Queue< TSeq > Class Template Reference

Controls which agents are verified at each step.

```
#include <queue-bones.hpp>
```

Public Member Functions

- void **operator+=** ([Agent](#)< TSeq > *p)
- void **operator-=** ([Agent](#)< TSeq > *p)
- epiworld_fast_int **operator[]** (unsigned int i) const
- void **set_model** ([Model](#)< TSeq > *m)

5.183.1 Detailed Description

```
template<typename TSeq = int>
class Queue< TSeq >
```

Controls which agents are verified at each step.

The idea is that only agents who are either in an infected state or have an infected neighbor should be checked. Otherwise it makes no sense (no chance to recover or capture the disease).

Template Parameters

<i>TSeq</i>	
-------------	--

The documentation for this class was generated from the following files:

- include/epiworld/agent-bones.hpp
- include/epiworld/queue-bones.hpp

5.184 RandGraph Class Reference

Public Member Functions

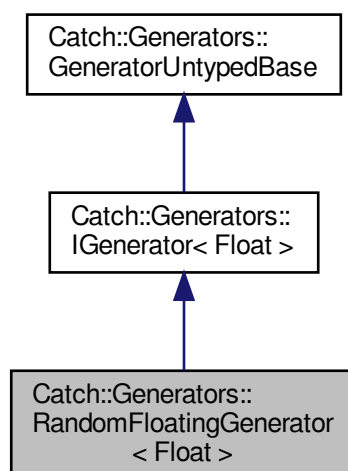
- **RandGraph** (int N_)
- void **init** (int s)
- void **set_rand_engine** (std::mt19937 &e)
- epiworld_double **runif** ()

The documentation for this class was generated from the following file:

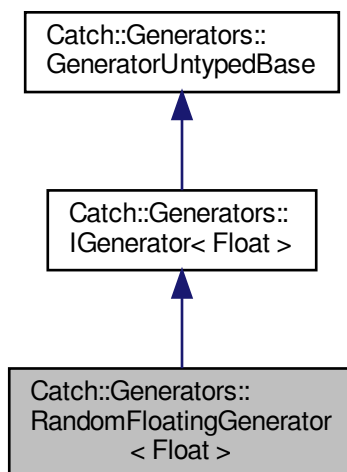
- include/epiworld/random_graph.hpp

5.185 Catch::Generators::RandomFloatingGenerator< Float > Class Template Reference

Inheritance diagram for Catch::Generators::RandomFloatingGenerator< Float >:



Collaboration diagram for `Catch::Generators::RandomFloatingGenerator< Float >`:



Public Member Functions

- **RandomFloatingGenerator** (Float a, Float b, std::uint32_t seed)
- Float const & **get** () const override
- bool **next** () override

Additional Inherited Members

5.185.1 Member Function Documentation

5.185.1.1 next()

```

template<typename Float >
bool Catch::Generators::RandomFloatingGenerator< Float >::next ( ) [inline], [override],
[virtual]
  
```

Attempts to move the generator to the next element

Returns true iff the move succeeded (and a valid element can be retrieved).

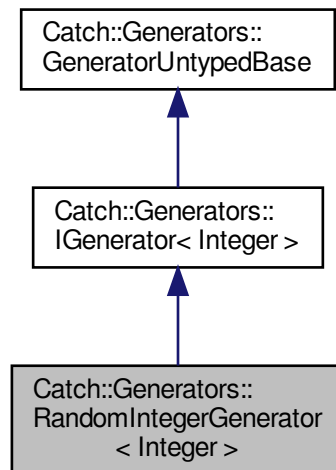
Implements [Catch::Generators::GeneratorUntypedBase](#).

The documentation for this class was generated from the following file:

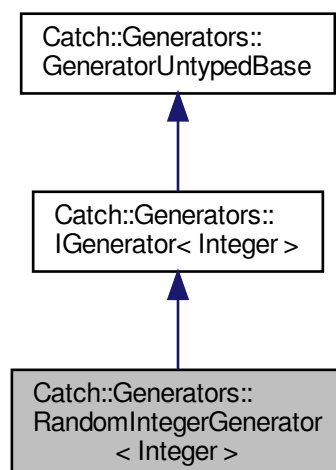
- include/catch2/[catch_amalgamated.hpp](#)

5.186 Catch::Generators::RandomIntegerGenerator< Integer > Class Template Reference

Inheritance diagram for Catch::Generators::RandomIntegerGenerator< Integer >:



Collaboration diagram for Catch::Generators::RandomIntegerGenerator< Integer >:



Public Member Functions

- **RandomIntegerGenerator** (Integer a, Integer b, std::uint32_t seed)

- Integer const & **get** () const override
- bool **next** () override

Additional Inherited Members

5.186.1 Member Function Documentation

5.186.1.1 next()

```
template<typename Integer >
bool Catch::Generators::RandomIntegerGenerator< Integer >::next ( ) [inline], [override],
[virtual]
```

Attempts to move the generator to the next element

Returns true iff the move succeeded (and a valid element can be retrieved).

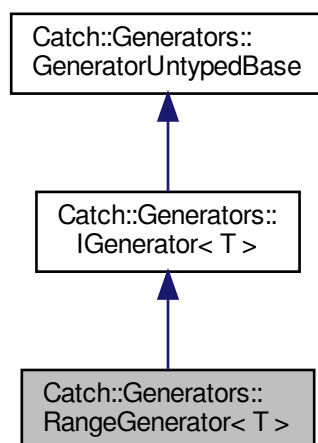
Implements [Catch::Generators::GeneratorUntypedBase](#).

The documentation for this class was generated from the following file:

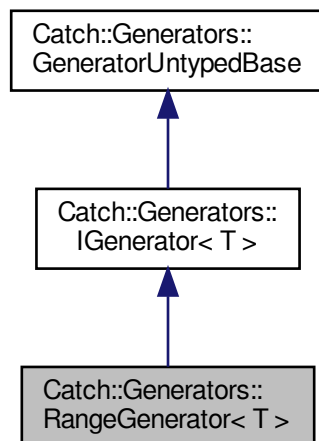
- include/catch2/[catch_amalgamated.hpp](#)

5.187 Catch::Generators::RangeGenerator< T > Class Template Reference

Inheritance diagram for Catch::Generators::RangeGenerator< T >:



Collaboration diagram for Catch::Generators::RangeGenerator< T >:



Public Member Functions

- **RangeGenerator** (T const &start, T const &end, T const &step)
- **RangeGenerator** (T const &start, T const &end)
- T const & **get** () const override
- bool **next** () override

Additional Inherited Members

5.187.1 Member Function Documentation

5.187.1.1 next()

```
template<typename T >
bool Catch::Generators::RangeGenerator< T >::next ( ) [inline], [override], [virtual]
```

Attempts to move the generator to the next element

Returns true iff the move succeeded (and a valid element can be retrieved).

Implements [Catch::Generators::GeneratorUntypedBase](#).

The documentation for this class was generated from the following file:

- include/catch2/catch_amalgamated.hpp

5.188 `Catch::ratio_string< Ratio >` Struct Template Reference

Static Public Member Functions

- static std::string **symbol** ()

The documentation for this struct was generated from the following file:

- include/catch2/[catch_amalgamated.hpp](#)

5.189 `Catch::ratio_string< std::atto >` Struct Reference

Static Public Member Functions

- static char **symbol** ()

The documentation for this struct was generated from the following file:

- include/catch2/[catch_amalgamated.hpp](#)

5.190 `Catch::ratio_string< std::femto >` Struct Reference

Static Public Member Functions

- static char **symbol** ()

The documentation for this struct was generated from the following file:

- include/catch2/[catch_amalgamated.hpp](#)

5.191 `Catch::ratio_string< std::micro >` Struct Reference

Static Public Member Functions

- static char **symbol** ()

The documentation for this struct was generated from the following file:

- include/catch2/[catch_amalgamated.hpp](#)

5.192 Catch::ratio_string< std::milli > Struct Reference

Static Public Member Functions

- static char **symbol** ()

The documentation for this struct was generated from the following file:

- include/catch2/[catch_amalgamated.hpp](#)

5.193 Catch::ratio_string< std::nano > Struct Reference

Static Public Member Functions

- static char **symbol** ()

The documentation for this struct was generated from the following file:

- include/catch2/[catch_amalgamated.hpp](#)

5.194 Catch::ratio_string< std::pico > Struct Reference

Static Public Member Functions

- static char **symbol** ()

The documentation for this struct was generated from the following file:

- include/catch2/[catch_amalgamated.hpp](#)

5.195 Catch::RedirectedStdErr Class Reference

Public Member Functions

- auto **str** () const -> std::string

The documentation for this class was generated from the following file:

- include/catch2/[catch_amalgamated.hpp](#)

5.196 Catch::RedirectedStdOut Class Reference

Public Member Functions

- auto **str** () const -> std::string

The documentation for this class was generated from the following file:

- include/catch2/[catch_amalgamated.hpp](#)

5.197 Catch::RedirectedStream Class Reference

Public Member Functions

- **RedirectedStream** (std::ostream &originalStream, std::ostream &redirectionStream)

The documentation for this class was generated from the following file:

- include/catch2/[catch_amalgamated.hpp](#)

5.198 Catch::RedirectedStreams Class Reference

Public Member Functions

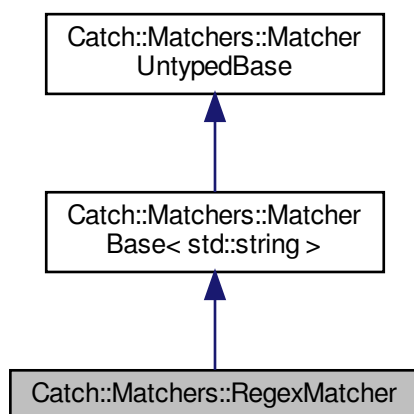
- **RedirectedStreams** ([RedirectedStreams](#) const &)=delete
- [RedirectedStreams](#) & **operator=** ([RedirectedStreams](#) const &)=delete
- **RedirectedStreams** ([RedirectedStreams](#) &&)=delete
- [RedirectedStreams](#) & **operator=** ([RedirectedStreams](#) &&)=delete
- **RedirectedStreams** (std::string &redirectedCout, std::string &redirectedCerr)

The documentation for this class was generated from the following file:

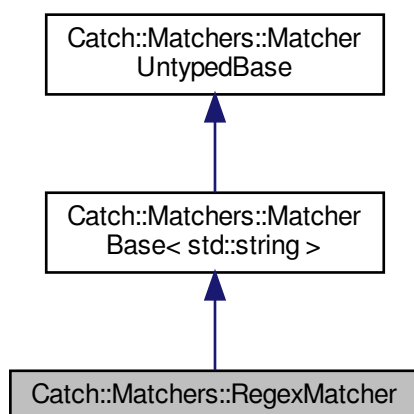
- include/catch2/[catch_amalgamated.hpp](#)

5.199 Catch::Matchers::RegexMatcher Class Reference

Inheritance diagram for Catch::Matchers::RegexMatcher:



Collaboration diagram for Catch::Matchers::RegexMatcher:



Public Member Functions

- **RegexMatcher** (std::string regex, CaseSensitive caseSensitivity)
- bool **match** (std::string const &matchee) const override
- std::string **describe** () const override

Additional Inherited Members

The documentation for this class was generated from the following file:

- include/catch2/[catch_amalgamated.hpp](#)

5.200 Catch::RegistrarForTagAliases Struct Reference

Public Member Functions

- **RegistrarForTagAliases** (char const *alias, char const *tag, [SourceLineInfo](#) const &lineInfo)

The documentation for this struct was generated from the following file:

- include/catch2/[catch_amalgamated.hpp](#)

5.201 Catch::Benchmark::Detail::repeater< Fun > Struct Template Reference

Public Member Functions

- void **operator()** (int k) const

Public Attributes

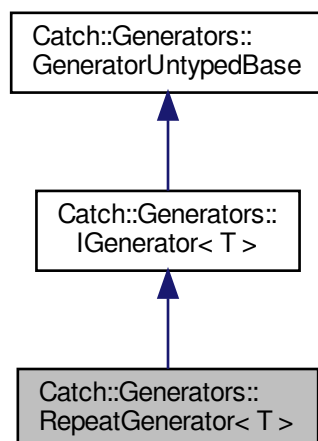
- Fun **fun**

The documentation for this struct was generated from the following file:

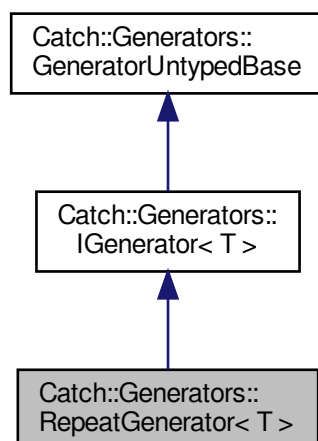
- include/catch2/[catch_amalgamated.hpp](#)

5.202 Catch::Generators::RepeatGenerator< T > Class Template Reference

Inheritance diagram for Catch::Generators::RepeatGenerator< T >:



Collaboration diagram for Catch::Generators::RepeatGenerator< T >:



Public Member Functions

- **RepeatGenerator** (size_t repeats, [GeneratorWrapper](#)< T > &&generator)
- T const & **get** () const override
- bool **next** () override

Additional Inherited Members

5.202.1 Member Function Documentation

5.202.1.1 next()

```
template<typename T >
bool Catch::Generators::RepeatGenerator< T >::next ( ) [inline], [override], [virtual]
```

Attempts to move the generator to the next element

Returns true iff the move succeeded (and a valid element can be retrieved).

Implements [Catch::Generators::GeneratorUntypedBase](#).

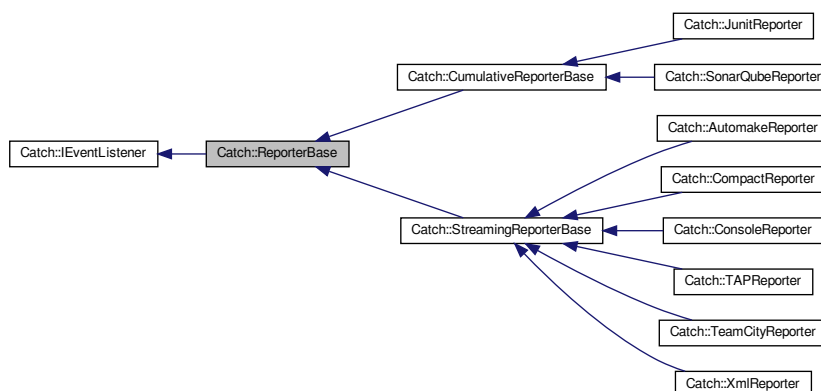
The documentation for this class was generated from the following file:

- [include/catch2/catch_amalgamated.hpp](#)

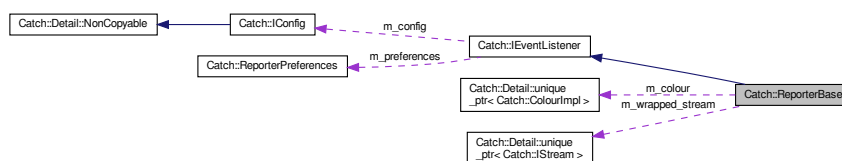
5.203 Catch::ReporterBase Class Reference

```
#include <catch_amalgamated.hpp>
```

Inheritance diagram for Catch::ReporterBase:



Collaboration diagram for Catch::ReporterBase:



Public Member Functions

- **ReporterBase** ([ReporterConfig](#) &&config)
- void [listReporters](#) (std::vector< [ReporterDescription](#) > const &descriptions) override
- void [listListeners](#) (std::vector< [ListenerDescription](#) > const &descriptions) override
- void [listTests](#) (std::vector< [TestCaseHandle](#) > const &tests) override
- void [listTags](#) (std::vector< [TagInfo](#) > const &tags) override

Protected Attributes

- [Detail::unique_ptr< IStream > m_wrapped_stream](#)
The stream wrapper as passed to us by outside code.
- std::ostream & [m_stream](#)
- [Detail::unique_ptr< ColourImpl > m_colour](#)
Colour implementation this reporter was configured for.
- std::map< std::string, std::string > [m_customOptions](#)
The custom reporter options user passed down to the reporter.

5.203.1 Detailed Description

This is the base class for all reporters.

If are writing a reporter, you must derive from this type, or one of the helper reporter bases that are derived from this type.

[ReporterBase](#) centralizes handling of various common tasks in reporters, like storing the right stream for the reporters to write to, and providing the default implementation of the different listing events.

5.203.2 Member Function Documentation

5.203.2.1 listListeners()

```
void Catch::ReporterBase::listListeners (
    std::vector< ListenerDescription > const & descriptions ) [override], [virtual]
```

Provides a simple default listing of listeners

Looks similarly to listing of reporters, but with listener type instead of reporter name.

Implements [Catch::IEventListener](#).

Reimplemented in [Catch::XmlReporter](#).

5.203.2.2 listReporters()

```
void Catch::ReporterBase::listReporters (
    std::vector< ReporterDescription > const & descriptions ) [override], [virtual]
```

Provides a simple default listing of reporters.

Should look roughly like the reporter listing in v2 and earlier versions of Catch2.

Implements [Catch::IEventListener](#).

Reimplemented in [Catch::XmlReporter](#).

5.203.2.3 listTags()

```
void Catch::ReporterBase::listTags (
    std::vector< TagInfo > const & tags ) [override], [virtual]
```

Provides a simple default listing of tags.

Should look roughly like the tag listing in v2 and earlier versions of Catch2.

Implements [Catch::IEventListener](#).

Reimplemented in [Catch::XmlReporter](#).

5.203.2.4 listTests()

```
void Catch::ReporterBase::listTests (
    std::vector< TestCaseHandle > const & tests ) [override], [virtual]
```

Provides a simple default listing of tests.

Should look roughly like the test listing in v2 and earlier versions of Catch2. Especially supports low-verbosity listing that mimics the old `--list-test-names-only` output.

Implements [Catch::IEventListener](#).

Reimplemented in [Catch::XmlReporter](#).

5.203.3 Member Data Documentation

5.203.3.1 m_stream

```
std::ostream& Catch::ReporterBase::m_stream [protected]
```

Cached output stream from `m_wrapped_stream` to reduce number of indirect calls needed to write output.

The documentation for this class was generated from the following file:

- [include/catch2/catch_amalgamated.hpp](#)

5.204 Catch::ReporterConfig Struct Reference

Public Member Functions

- **ReporterConfig** ([IConfig](#) const * `_fullConfig`, [Detail::unique_ptr](#)< [IStream](#) > `_stream`, [ColourMode](#) `colourMode`, [std::map](#)< [std::string](#), [std::string](#) > `customOptions`)
- **ReporterConfig** ([ReporterConfig](#) &&)=default
- [ReporterConfig](#) & **operator=** ([ReporterConfig](#) &&)=default
- [Detail::unique_ptr](#)< [IStream](#) > **takeStream** () &&
- [IConfig](#) const * **fullConfig** () const
- [ColourMode](#) **colourMode** () const
- [std::map](#)< [std::string](#), [std::string](#) > const & **customOptions** () const

The documentation for this struct was generated from the following file:

- [include/catch2/catch_amalgamated.hpp](#)

5.205 Catch::ReporterDescription Struct Reference

Public Attributes

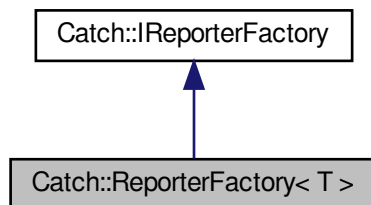
- [std::string](#) **name**
- [std::string](#) **description**

The documentation for this struct was generated from the following file:

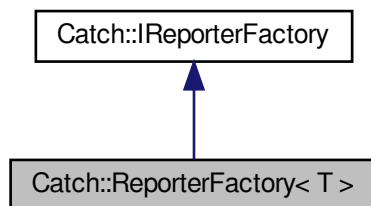
- [include/catch2/catch_amalgamated.hpp](#)

5.206 Catch::ReporterFactory< T > Class Template Reference

Inheritance diagram for Catch::ReporterFactory< T >:



Collaboration diagram for Catch::ReporterFactory< T >:



Additional Inherited Members

The documentation for this class was generated from the following file:

- [include/catch2/catch_amalgamated.hpp](#)

5.207 Catch::ReporterPreferences Struct Reference

```
#include <catch_amalgamated.hpp>
```

Public Attributes

- `bool` [shouldRedirectStdOut](#) = false
- `bool` [shouldReportAllAssertions](#) = false

5.207.1 Detailed Description

By setting up its preferences, a reporter can modify Catch2's behaviour in some regards, e.g. it can request Catch2 to capture writes to stdout/stderr during test execution, and pass them to the reporter.

5.207.2 Member Data Documentation

5.207.2.1 shouldRedirectStdOut

```
bool Catch::ReporterPreferences::shouldRedirectStdOut = false
```

Catch2 should redirect writes to stdout and pass them to the reporter

5.207.2.2 shouldReportAllAssertions

```
bool Catch::ReporterPreferences::shouldReportAllAssertions = false
```

Catch2 should call `Reporter::assertionEnded` even for passing assertions

The documentation for this struct was generated from the following file:

- [include/catch2/catch_amalgamated.hpp](#)

5.208 Catch::ReporterRegistrar< T > Class Template Reference

Public Member Functions

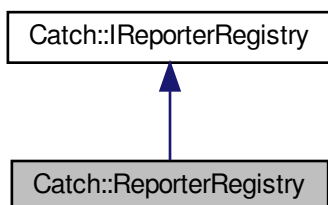
- **ReporterRegistrar** (std::string const &name)

The documentation for this class was generated from the following file:

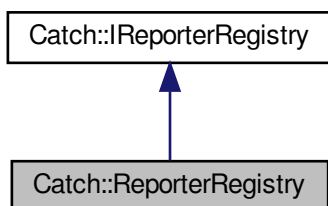
- [include/catch2/catch_amalgamated.hpp](#)

5.209 Catch::ReporterRegistry Class Reference

Inheritance diagram for Catch::ReporterRegistry:



Collaboration diagram for Catch::ReporterRegistry:



Public Member Functions

- [IEventListenerPtr](#) **create** (std::string const &name, [ReporterConfig](#) &&config) const override
- void **registerReporter** (std::string const &name, [IReporterFactoryPtr](#) factory)
- void **registerListener** ([Detail::unique_ptr](#)< [EventListenerFactory](#) > factory)
- FactoryMap const & **getFactories** () const override
- Listeners const & **getListeners** () const override

Additional Inherited Members

The documentation for this class was generated from the following file:

- include/catch2/[catch_amalgamated.hpp](#)

5.210 Catch::ReporterSpec Class Reference

```
#include <catch_amalgamated.hpp>
```

Public Member Functions

- **ReporterSpec** (std::string name, [Optional](#)< std::string > outputFileName, [Optional](#)< [ColourMode](#) > colourMode, std::map< std::string, std::string > customOptions)
- std::string const & **name** () const
- [Optional](#)< std::string > const & **outputFile** () const
- [Optional](#)< [ColourMode](#) > const & **colourMode** () const
- std::map< std::string, std::string > const & **customOptions** () const

Friends

- bool **operator==** ([ReporterSpec](#) const &lhs, [ReporterSpec](#) const &rhs)
- bool **operator!=** ([ReporterSpec](#) const &lhs, [ReporterSpec](#) const &rhs)

5.210.1 Detailed Description

Structured reporter spec that a reporter can be created from

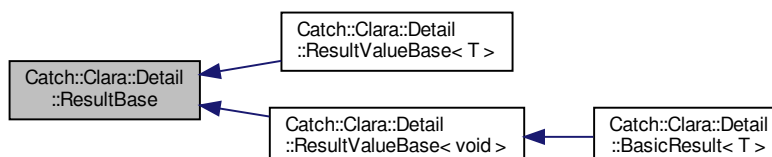
Parsing has been validated, but semantics have not. This means e.g. that the colour mode is known to Catch2, but it might not be compiled into the binary, and the output filename might not be openable.

The documentation for this class was generated from the following file:

- include/catch2/[catch_amalgamated.hpp](#)

5.211 Catch::Clara::Detail::ResultBase Class Reference

Inheritance diagram for Catch::Clara::Detail::ResultBase:



Protected Member Functions

- **ResultBase** ([ResultType](#) type)
- **ResultBase** ([ResultBase](#) const &)=default
- [ResultBase](#) & **operator=** ([ResultBase](#) const &)=default
- **ResultBase** ([ResultBase](#) &&)=default
- [ResultBase](#) & **operator=** ([ResultBase](#) &&)=default
- virtual void **enforceOk** () const =0

Protected Attributes

- [ResultType](#) m_type

The documentation for this class was generated from the following file:

- include/catch2/[catch_amalgamated.hpp](#)

5.212 Catch::ResultDisposition Struct Reference

Public Types

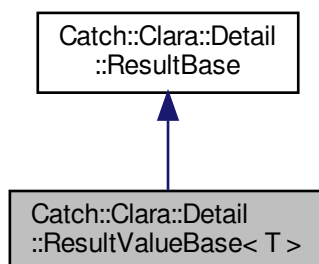
- enum **Flags** { **Normal** = 0x01 , **ContinueOnFailure** = 0x02 , **FalseTest** = 0x04 , **SuppressFail** = 0x08 }

The documentation for this struct was generated from the following file:

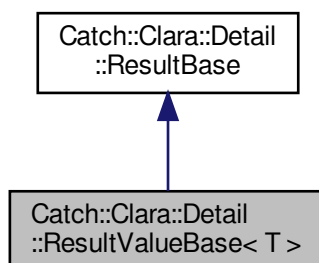
- include/catch2/[catch_amalgamated.hpp](#)

5.213 Catch::Clara::Detail::ResultValueBase< T > Class Template Reference

Inheritance diagram for Catch::Clara::Detail::ResultValueBase< T >:



Collaboration diagram for Catch::Clara::Detail::ResultValueBase< T >:



Public Member Functions

- auto **value** () const -> T const &

Protected Member Functions

- **ResultValueBase** ([ResultType](#) type)
- **ResultValueBase** ([ResultValueBase](#) const &other)
- **ResultValueBase** ([ResultType](#), T const &value)
- auto **operator=** ([ResultValueBase](#) const &other) -> [ResultValueBase](#) &

Protected Attributes

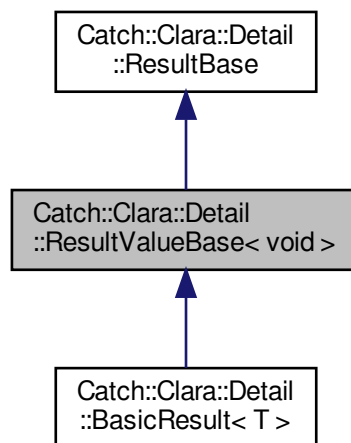
- union {
 T **m_value**
};

The documentation for this class was generated from the following file:

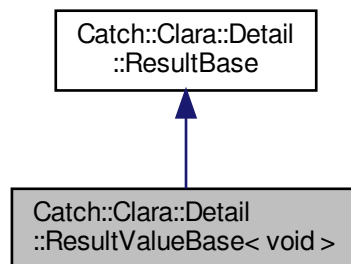
- include/catch2/[catch_amalgamated.hpp](#)

5.214 Catch::Clara::Detail::ResultValueBase< void > Class Reference

Inheritance diagram for Catch::Clara::Detail::ResultValueBase< void >:



Collaboration diagram for Catch::Clara::Detail::ResultValueBase< void >:



Protected Member Functions

- **ResultBase** ([ResultType](#) type)
- **ResultBase** ([ResultBase](#) const &)=default
- **ResultBase** ([ResultBase](#) &&)=default

Additional Inherited Members

The documentation for this class was generated from the following file:

- [include/catch2/catch_amalgamated.hpp](#)

5.215 Catch::ResultWas Struct Reference

Public Types

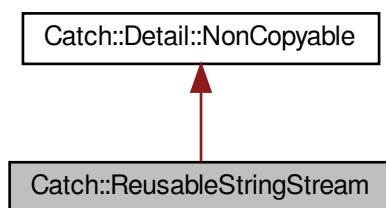
- enum **OfType** {
 Unknown = -1 , **Ok** = 0 , **Info** = 1 , **Warning** = 2 ,
 FailureBit = 0x10 , **ExpressionFailed** = FailureBit | 1 , **ExplicitFailure** = FailureBit | 2 , **Exception** = 0x100
 | FailureBit ,
 ThrewException = Exception | 1 , **DidntThrowException** = Exception | 2 , **FatalErrorCondition** = 0x200 |
 FailureBit }

The documentation for this struct was generated from the following file:

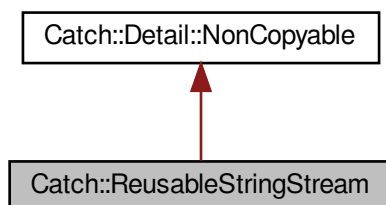
- include/catch2/[catch_amalgamated.hpp](#)

5.216 Catch::ReusableStringStream Class Reference

Inheritance diagram for Catch::ReusableStringStream:



Collaboration diagram for Catch::ReusableStringStream:



Public Member Functions

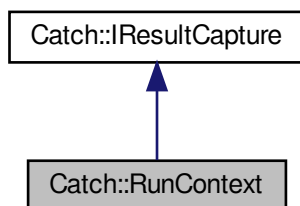
- `std::string str () const`
Returns the serialized state.
- `void str (std::string const &str)`
Sets internal state to `str`
- `template<typename T >`
`auto operator<< (T const &value) -> ReusableStringStream &`
- `auto get () -> std::ostream &`

The documentation for this class was generated from the following file:

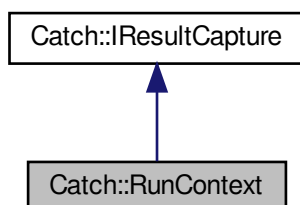
- `include/catch2/catch_amalgamated.hpp`

5.217 Catch::RunContext Class Reference

Inheritance diagram for Catch::RunContext:



Collaboration diagram for Catch::RunContext:



Public Member Functions

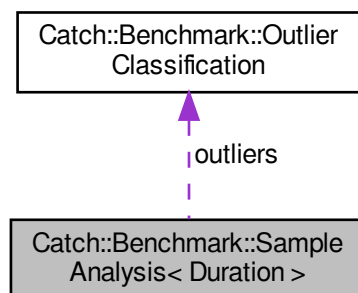
- **RunContext** ([RunContext](#) const &)=delete
- **RunContext** & **operator=** ([RunContext](#) const &)=delete
- **RunContext** ([IConfig](#) const * _config, [IEventListenerPtr](#) &&reporter)
- **Totals** **runTest** ([TestCaseHandle](#) const &testCase)
- void **handleExpr** ([AssertionInfo](#) const &info, [ITransientExpression](#) const &expr, [AssertionReaction](#) &reaction) override
- void **handleMessage** ([AssertionInfo](#) const &info, [ResultWas::OfType](#) resultType, [StringRef](#) message, [AssertionReaction](#) &reaction) override
- void **handleUnexpectedExceptionNotThrown** ([AssertionInfo](#) const &info, [AssertionReaction](#) &reaction) override
- void **handleUnexpectedInflightException** ([AssertionInfo](#) const &info, std::string const &message, [AssertionReaction](#) &reaction) override
- void **handleIncomplete** ([AssertionInfo](#) const &info) override
- void **handleNonExpr** ([AssertionInfo](#) const &info, [ResultWas::OfType](#) resultType, [AssertionReaction](#) &reaction) override
- bool **sectionStarted** ([SectionInfo](#) const §ionInfo, [Counts](#) &assertions) override
- void **sectionEnded** ([SectionEndInfo](#) const &endInfo) override
- void **sectionEndedEarly** ([SectionEndInfo](#) const &endInfo) override
- auto **acquireGeneratorTracker** ([StringRef](#) generatorName, [SourceLineInfo](#) const &lineInfo) -> [IGeneratorTracker](#) &override
- void **benchmarkPreparing** ([StringRef](#) name) override
- void **benchmarkStarting** ([BenchmarkInfo](#) const &info) override
- void **benchmarkEnded** ([BenchmarkStats](#)<> const &stats) override
- void **benchmarkFailed** ([StringRef](#) error) override
- void **pushScopedMessage** ([MessageInfo](#) const &message) override
- void **popScopedMessage** ([MessageInfo](#) const &message) override
- void **emplaceUnscopedMessage** ([MessageBuilder](#) const &builder) override
- std::string **getCurrentTestName** () const override
- const [AssertionResult](#) * **getLastResult** () const override
- void **exceptionEarlyReported** () override
- void **handleFatalErrorCondition** ([StringRef](#) message) override
- bool **lastAssertionPassed** () override
- void **assertionPassed** () override
- bool **aborting** () const

The documentation for this class was generated from the following file:

- include/catch2/[catch_amalgamated.hpp](#)

5.218 Catch::Benchmark::SampleAnalysis< Duration > Struct Template Reference

Collaboration diagram for Catch::Benchmark::SampleAnalysis< Duration >:



Public Member Functions

- `template<typename Duration2 > operator SampleAnalysis< Duration2 > () const`

Public Attributes

- `std::vector< Duration > samples`
- `Estimate< Duration > mean`
- `Estimate< Duration > standard_deviation`
- `OutlierClassification outliers`
- `double outlier_variance`

The documentation for this struct was generated from the following file:

- `include/catch2/catch_amalgamated.hpp`

5.219 Catch::XmlWriter::ScopedElement Class Reference

Public Member Functions

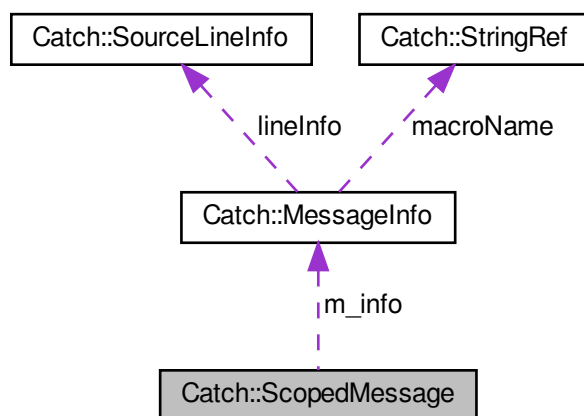
- `ScopedElement (XmlWriter *writer, XmlFormatting fmt)`
- `ScopedElement (ScopedElement &&other) noexcept`
- `ScopedElement & operator= (ScopedElement &&other) noexcept`
- `ScopedElement & writeText (StringRef text, XmlFormatting fmt=XmlFormatting::Newline|XmlFormatting::↵ Indent)`
- `ScopedElement & writeAttribute (StringRef name, StringRef attribute)`
- `template<typename T, typename = typename std::enable_if_t< !std::is_convertible<T, StringRef>::value>> ScopedElement & writeAttribute (StringRef name, T const &attribute)`

The documentation for this class was generated from the following file:

- `include/catch2/catch_amalgamated.hpp`

5.220 Catch::ScopedMessage Class Reference

Collaboration diagram for Catch::ScopedMessage:



Public Member Functions

- **ScopedMessage** ([MessageBuilder](#) const &builder)
- **ScopedMessage** ([ScopedMessage](#) &duplicate)=delete
- **ScopedMessage** ([ScopedMessage](#) &&old) noexcept

Public Attributes

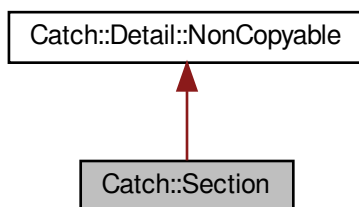
- [MessageInfo](#) **m_info**
- bool **m_moved** = false

The documentation for this class was generated from the following file:

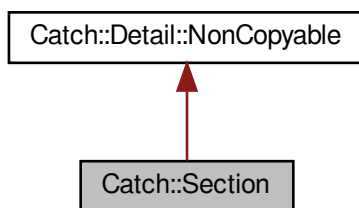
- include/catch2/[catch_amalgamated.hpp](#)

5.221 Catch::Section Class Reference

Inheritance diagram for Catch::Section:



Collaboration diagram for Catch::Section:



Public Member Functions

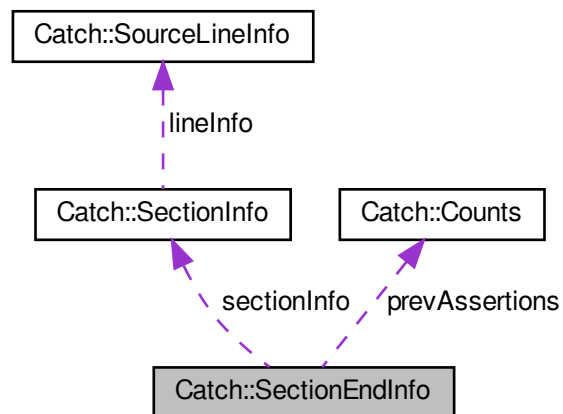
- **Section** ([SectionInfo](#) &&info)
- **operator bool** () const

The documentation for this class was generated from the following file:

- include/catch2/[catch_amalgamated.hpp](#)

5.222 Catch::SectionEndInfo Struct Reference

Collaboration diagram for Catch::SectionEndInfo:



Public Attributes

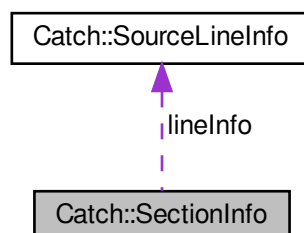
- [SectionInfo](#) `sectionInfo`
- [Counts](#) `prevAssertions`
- double `durationInSeconds`

The documentation for this struct was generated from the following file:

- [include/catch2/catch_amalgamated.hpp](#)

5.223 Catch::SectionInfo Struct Reference

Collaboration diagram for Catch::SectionInfo:



Public Member Functions

- **SectionInfo** ([SourceLineInfo](#) const &_lineInfo, std::string _name, const char *const = nullptr)

Public Attributes

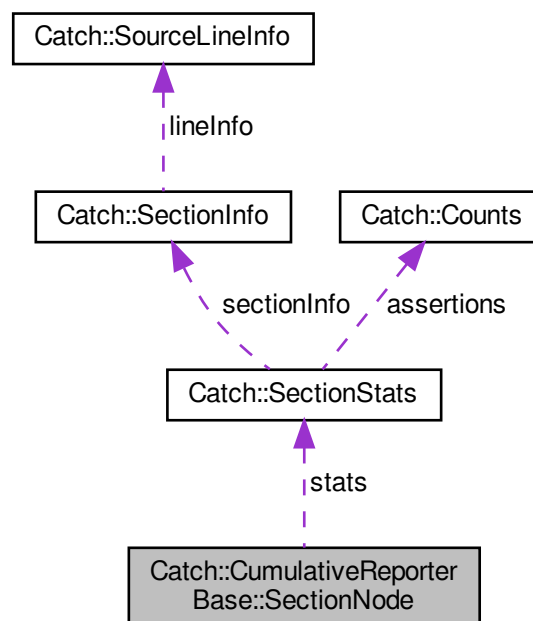
- std::string **name**
- [SourceLineInfo](#) **lineInfo**

The documentation for this struct was generated from the following file:

- include/catch2/[catch_amalgamated.hpp](#)

5.224 Catch::CumulativeReporterBase::SectionNode Struct Reference

Collaboration diagram for Catch::CumulativeReporterBase::SectionNode:



Public Member Functions

- **SectionNode** ([SectionStats](#) const &_stats)
- bool **operator==** ([SectionNode](#) const &other) const
- bool **hasAnyAssertions** () const

Public Attributes

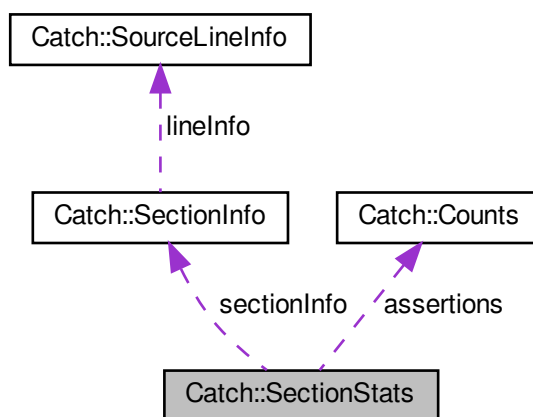
- [SectionStats](#) **stats**
- `std::vector< Detail::unique_ptr< SectionNode > >` **childSections**
- `std::vector< Detail::AssertionOrBenchmarkResult >` **assertionsAndBenchmarks**
- `std::string` **stdOut**
- `std::string` **stdErr**

The documentation for this struct was generated from the following file:

- `include/catch2/catch_amalgamated.hpp`

5.225 Catch::SectionStats Struct Reference

Collaboration diagram for Catch::SectionStats:



Public Member Functions

- **SectionStats** ([SectionInfo](#) const &_sectionInfo, [Counts](#) const &_assertions, double _durationInSeconds, bool _missingAssertions)

Public Attributes

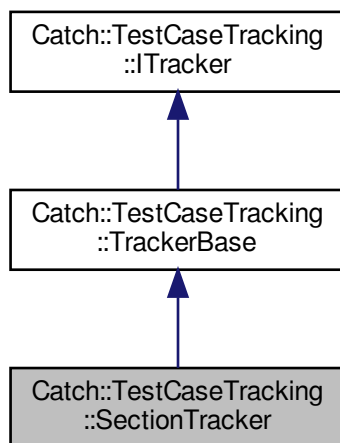
- [SectionInfo](#) **sectionInfo**
- [Counts](#) **assertions**
- double **durationInSeconds**
- bool **missingAssertions**

The documentation for this struct was generated from the following file:

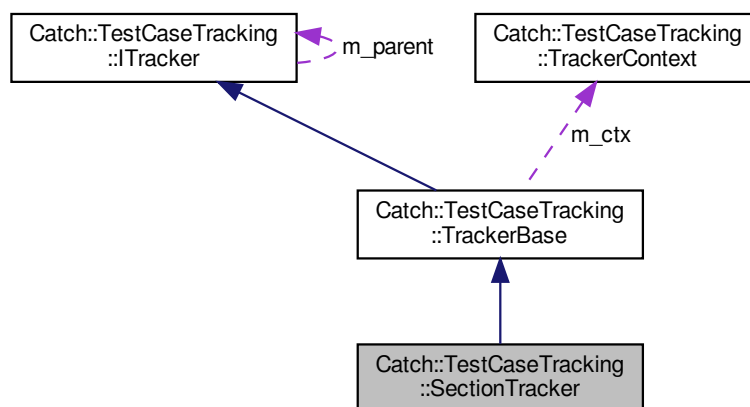
- `include/catch2/catch_amalgamated.hpp`

5.226 Catch::TestCaseTracking::SectionTracker Class Reference

Inheritance diagram for Catch::TestCaseTracking::SectionTracker:



Collaboration diagram for Catch::TestCaseTracking::SectionTracker:



Public Member Functions

- **SectionTracker** ([NameAndLocation](#) const &nameAndLocation, [TrackerContext](#) &ctx, [ITracker](#) *parent)
 - bool [isSectionTracker](#) () const override
 - bool [isComplete](#) () const override
- Returns true if tracker run to completion (successfully or not)*

- void **tryOpen** ()
- void **addInitialFilters** (std::vector< std::string > const &filters)
- void **addNextFilters** (std::vector< [StringRef](#) > const &filters)
- std::vector< [StringRef](#) > const & **getFilters** () const

Returns filters active in this tracker.

- [StringRef](#) **trimmedName** () const

Returns whitespace-trimmed name of the tracked section.

Static Public Member Functions

- static [SectionTracker](#) & **acquire** ([TrackerContext](#) &ctx, [NameAndLocation](#) const &nameAndLocation)

Additional Inherited Members

5.226.1 Member Function Documentation

5.226.1.1 isSectionTracker()

```
bool Catch::TestCaseTracking::SectionTracker::isSectionTracker ( ) const [override], [virtual]
```

Returns true if the instance is a section tracker

Subclasses should override to true if they are, replaces RTTI for internal debug checks.

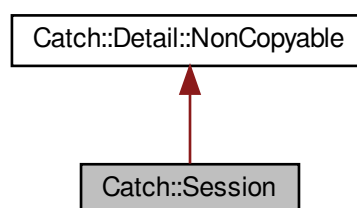
Reimplemented from [Catch::TestCaseTracking::ITracker](#).

The documentation for this class was generated from the following file:

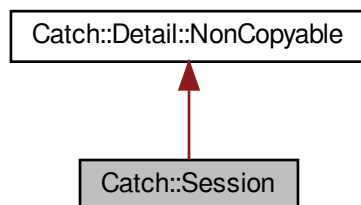
- include/catch2/[catch_amalgamated.hpp](#)

5.227 Catch::Session Class Reference

Inheritance diagram for Catch::Session:



Collaboration diagram for Catch::Session:



Public Member Functions

- void **showHelp** () const
- void **libIdentify** ()
- int **applyCommandLine** (int argc, char const *const *argv)
- void **useConfigData** ([ConfigData](#) const &configData)
- template<typename CharT >
int **run** (int argc, CharT const *const argv[])
- int **run** ()
- [Clara::Parser](#) const & **cli** () const
- void **cli** ([Clara::Parser](#) const &newParser)
- [ConfigData](#) & **configData** ()
- [Config](#) & **config** ()

The documentation for this class was generated from the following file:

- include/catch2/[catch_amalgamated.hpp](#)

5.228 Catch::SimplePcg32 Class Reference

Public Types

- using **result_type** = std::uint32_t

Public Member Functions

- **SimplePcg32** (result_type seed_)
- void **seed** (result_type seed_)
- void **discard** (uint64_t skip)
- result_type **operator()** ()

Static Public Member Functions

- static constexpr result_type() **min** ()
- static constexpr result_type() **max** ()

Friends

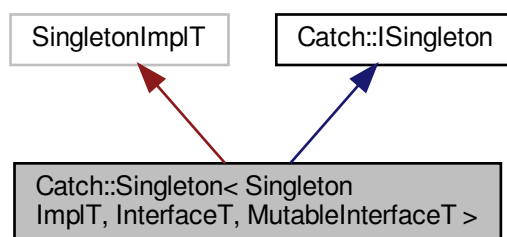
- bool **operator==** (SimplePcg32 const &lhs, SimplePcg32 const &rhs)
- bool **operator!=** (SimplePcg32 const &lhs, SimplePcg32 const &rhs)

The documentation for this class was generated from the following file:

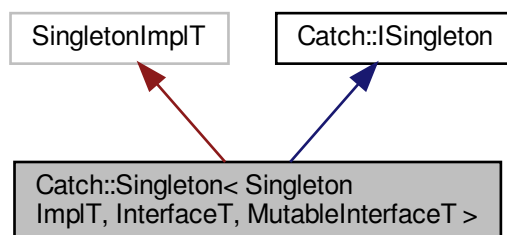
- include/catch2/catch_amalgamated.hpp

5.229 Catch::Singleton< SingletonImplT, InterfaceT, MutableInterfaceT > Class Template Reference

Inheritance diagram for Catch::Singleton< SingletonImplT, InterfaceT, MutableInterfaceT >:



Collaboration diagram for Catch::Singleton< SingletonImplT, InterfaceT, MutableInterfaceT >:



Static Public Member Functions

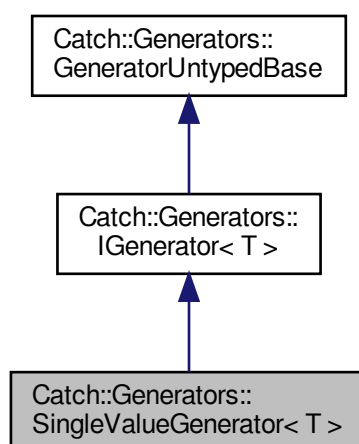
- static auto **get** () -> InterfaceT const &
- static auto **getMutable** () -> MutableInterfaceT &

The documentation for this class was generated from the following file:

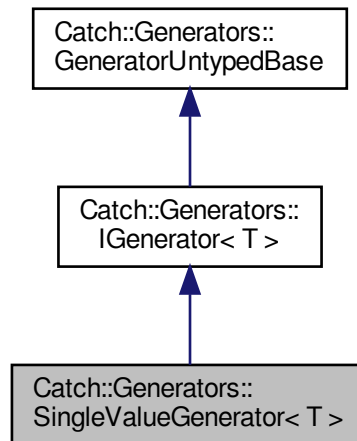
- include/catch2/[catch_amalgamated.hpp](#)

5.230 Catch::Generators::SingleValueGenerator< T > Class Template Reference

Inheritance diagram for Catch::Generators::SingleValueGenerator< T >:



Collaboration diagram for Catch::Generators::SingleValueGenerator< T >:



Public Member Functions

- **SingleValueGenerator** (T const &value)
- **SingleValueGenerator** (T &&value)
- T const & **get** () const override
- bool **next** () override

Additional Inherited Members

5.230.1 Member Function Documentation

5.230.1.1 next()

```
template<typename T >  
bool Catch::Generators::SingleValueGenerator< T >::next ( ) [inline], [override], [virtual]
```

Attempts to move the generator to the next element

Returns true iff the move succeeded (and a valid element can be retrieved).

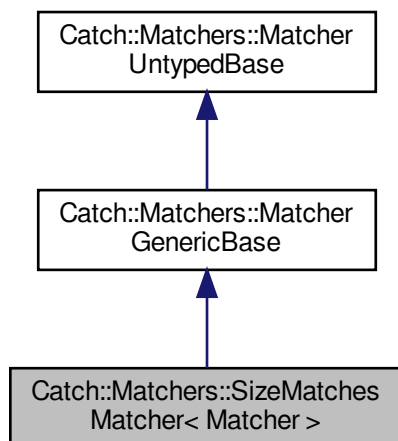
Implements [Catch::Generators::GeneratorUntypedBase](#).

The documentation for this class was generated from the following file:

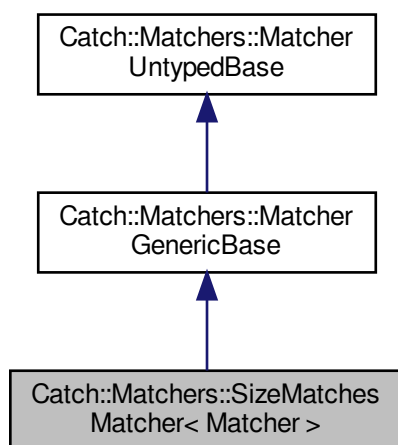
- include/catch2/catch_amalgamated.hpp

5.231 Catch::Matchers::SizeMatchesMatcher< Matcher > Class Template Reference

Inheritance diagram for Catch::Matchers::SizeMatchesMatcher< Matcher >:



Collaboration diagram for Catch::Matchers::SizeMatchesMatcher< Matcher >:



Public Member Functions

- **SizeMatchesMatcher** (Matcher m)
- `template<typename RangeLike >`
`bool match (RangeLike &&rng) const`
- `std::string describe () const` override

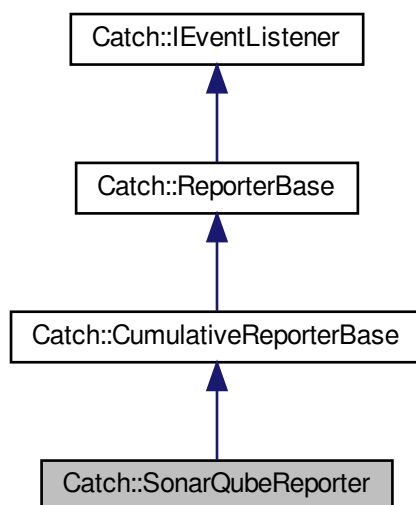
Additional Inherited Members

The documentation for this class was generated from the following file:

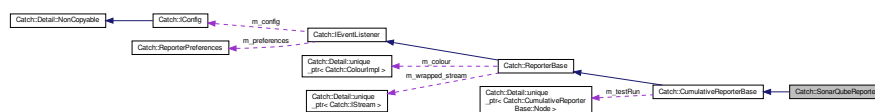
- include/catch2/catch_amalgamated.hpp

5.232 Catch::SonarQubeReporter Class Reference

Inheritance diagram for Catch::SonarQubeReporter:



Collaboration diagram for Catch::SonarQubeReporter:



Public Member Functions

- **SonarQubeReporter** (**ReporterConfig** &&config)
- void **testRunStarting** (**TestRunInfo** const &testRunInfo) override
- void **testRunEndedCumulative** () override
 - Customization point: called after last test finishes (testRunEnded has been handled)*
- void **writeRun** (**TestRunNode** const &groupNode)
- void **writeTestFile** (std::string const &filename, std::vector< **TestCaseNode** const * > const &testCaseNodes)
- void **writeTestCase** (**TestCaseNode** const &testCaseNode)
- void **writeSection** (std::string const &rootName, **SectionNode** const §ionNode, bool okToFail)
- void **writeAssertions** (**SectionNode** const §ionNode, bool okToFail)
- void **writeAssertion** (**AssertionStats** const &stats, bool okToFail)

Static Public Member Functions

- static std::string **getDescription** ()

Additional Inherited Members

5.232.1 Member Function Documentation

5.232.1.1 testRunStarting()

```
void Catch::SonarQubeReporter::testRunStarting (
    TestRunInfo const & testRunInfo ) [override], [virtual]
```

Called once in a testing run before tests are started

Not called if tests won't be run (e.g. only listing will happen)

Reimplemented from [Catch::CumulativeReporterBase](#).

The documentation for this class was generated from the following file:

- include/catch2/[catch_amalgamated.hpp](#)

5.233 Catch::SourceLineInfo Struct Reference

Public Member Functions

- constexpr **SourceLineInfo** (char const *_file, std::size_t _line) noexcept
- bool **operator==** ([SourceLineInfo](#) const &other) const noexcept
- bool **operator<** ([SourceLineInfo](#) const &other) const noexcept

Public Attributes

- char const * **file**
- std::size_t **line**

Friends

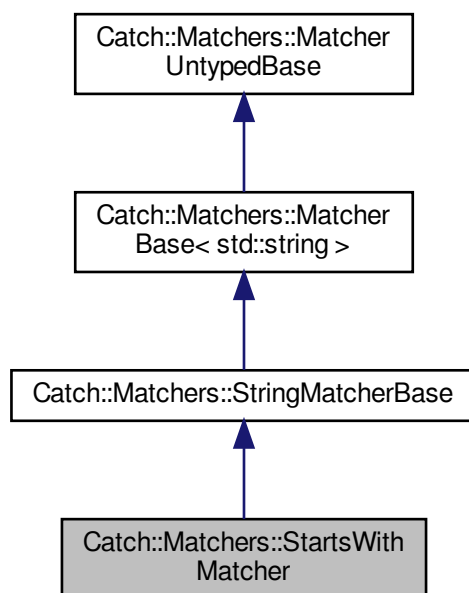
- std::ostream & **operator<<** (std::ostream &os, [SourceLineInfo](#) const &info)

The documentation for this struct was generated from the following file:

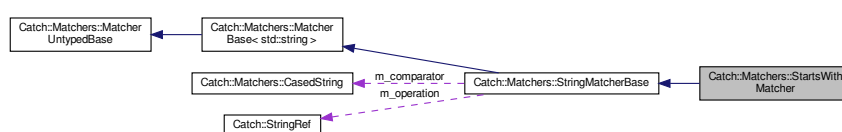
- include/catch2/[catch_amalgamated.hpp](#)

5.234 Catch::Matchers::StartsWithMatcher Class Reference

Inheritance diagram for Catch::Matchers::StartsWithMatcher:



Collaboration diagram for Catch::Matchers::StartsWithMatcher:



Public Member Functions

- **StartsWithMatcher** ([CasedString](#) const &comparator)
- **bool match** (std::string const &source) const override

Additional Inherited Members

The documentation for this class was generated from the following file:

- include/catch2/[catch_amalgamated.hpp](#)

5.235 Catch::StartupExceptionRegistry Class Reference

The documentation for this class was generated from the following file:

- [include/catch2/catch_amalgamated.hpp](#)

5.236 Catch::StreamEndStop Struct Reference

Public Member Functions

- [StringRef](#) **operator+** () const

Friends

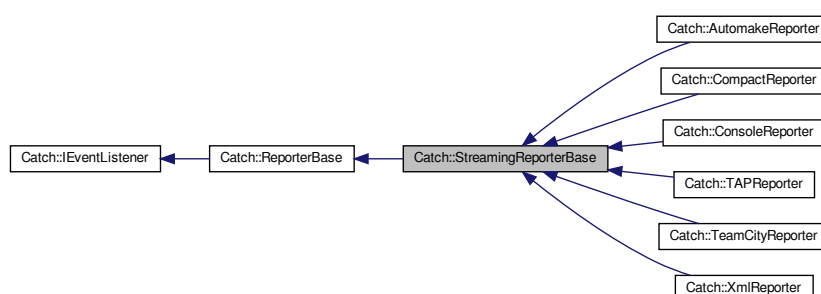
- `template<typename T >`
T const & **operator+** (T const &value, [StreamEndStop](#))

The documentation for this struct was generated from the following file:

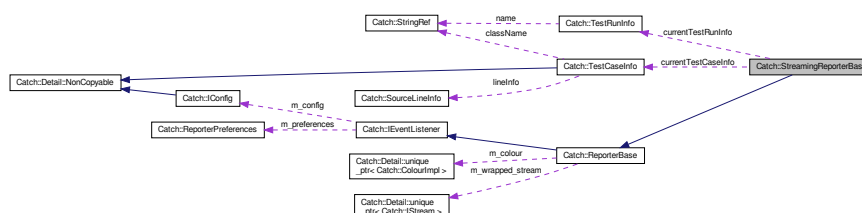
- [include/catch2/catch_amalgamated.hpp](#)

5.237 Catch::StreamingReporterBase Class Reference

Inheritance diagram for Catch::StreamingReporterBase:



Collaboration diagram for Catch::StreamingReporterBase:



Public Member Functions

- void [benchmarkPreparing](#) ([StringRef](#)) override
Called when user-code is being probed before the actual benchmark runs.
- void [benchmarkStarting](#) ([BenchmarkInfo](#) const &) override
Called after probe but before the user-code is being benchmarked.
- void [benchmarkEnded](#) ([BenchmarkStats](#)<> const &) override
Called with the benchmark results if benchmark successfully finishes.
- void [benchmarkFailed](#) ([StringRef](#)) override
Called if running the benchmarks fails for any reason.
- void [fatalErrorEncountered](#) ([StringRef](#)) override
Called if a fatal error (signal/structured exception) occurred.
- void [noMatchingTestCases](#) ([StringRef](#)) override
Called when no test cases match provided test spec.
- void [reportInvalidTestSpec](#) ([StringRef](#)) override
Called for all invalid test specs from the cli.
- void [testRunStarting](#) ([TestRunInfo](#) const & _testRunInfo) override
- void [testCaseStarting](#) ([TestCaseInfo](#) const & _testInfo) override
Called once for each TEST_CASE, no matter how many times it is entered.
- void [testCasePartialStarting](#) ([TestCaseInfo](#) const &, uint64_t) override
Called every time a TEST_CASE is entered, including repeats (due to sections)
- void [sectionStarting](#) ([SectionInfo](#) const & _sectionInfo) override
Called when a SECTION is being entered. Not called for skipped sections.
- void [assertionStarting](#) ([AssertionInfo](#) const &) override
Called before assertion success/failure is evaluated.
- void [assertionEnded](#) ([AssertionStats](#) const &) override
Called after assertion was fully evaluated.
- void [sectionEnded](#) ([SectionStats](#) const &) override
Called after a SECTION has finished running.
- void [testCasePartialEnded](#) ([TestCaseStats](#) const &, uint64_t) override
Called every time a TEST_CASE is entered, including repeats (due to sections)
- void [testCaseEnded](#) ([TestCaseStats](#) const &) override
Called once for each TEST_CASE, no matter how many times it is entered.
- void [testRunEnded](#) ([TestRunStats](#) const &) override
- void [skipTest](#) ([TestCaseInfo](#) const &) override
Called with test cases that are skipped due to the test run aborting.
- [ReporterBase](#) ([ReporterConfig](#) &&config)

Protected Attributes

- [TestRunInfo](#) [currentTestRunInfo](#) { "test run has not started yet" _sr }
- [TestCaseInfo](#) const * [currentTestCaseInfo](#) = nullptr
- std::vector< [SectionInfo](#) > [m_sectionStack](#)
Stack of all active sections in the current test case.

5.237.1 Member Function Documentation

5.237.1.1 testRunEnded()

```
void Catch::StreamingReporterBase::testRunEnded (
    TestRunStats const & testRunStats ) [override], [virtual]
```

Called once after all tests in a testing run are finished

Not called if tests weren't run (e.g. only listings happened)

Implements [Catch::IEventListener](#).

Reimplemented in [Catch::XmlReporter](#), [Catch::TeamCityReporter](#), [Catch::TAPReporter](#), [Catch::ConsoleReporter](#), and [Catch::CompactReporter](#).

5.237.1.2 testRunStarting()

```
void Catch::StreamingReporterBase::testRunStarting (
    TestRunInfo const & testRunInfo ) [override], [virtual]
```

Called once in a testing run before tests are started

Not called if tests won't be run (e.g. only listing will happen)

Implements [Catch::IEventListener](#).

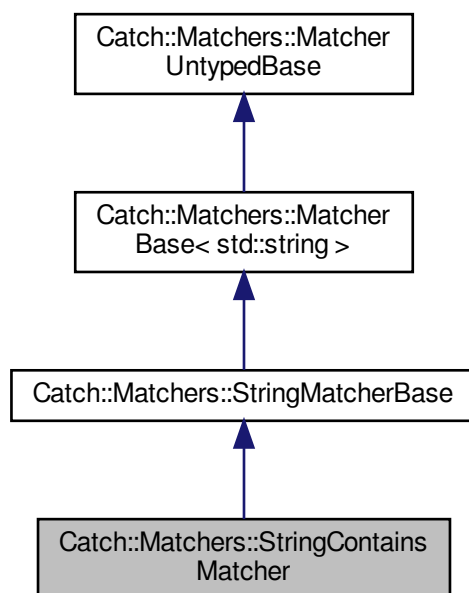
Reimplemented in [Catch::XmlReporter](#), [Catch::TAPReporter](#), [Catch::TeamCityReporter](#), [Catch::ConsoleReporter](#), and [Catch::CompactReporter](#).

The documentation for this class was generated from the following file:

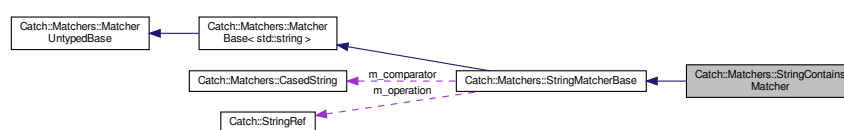
- [include/catch2/catch_amalgamated.hpp](#)

5.238 Catch::Matchers::StringContainsMatcher Class Reference

Inheritance diagram for Catch::Matchers::StringContainsMatcher:



Collaboration diagram for Catch::Matchers::StringContainsMatcher:



Public Member Functions

- **StringContainsMatcher** ([CasedString](#) const &comparator)
- bool **match** (std::string const &source) const override

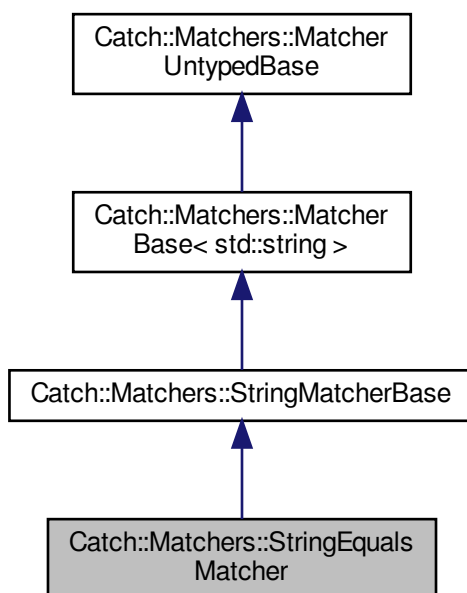
Additional Inherited Members

The documentation for this class was generated from the following file:

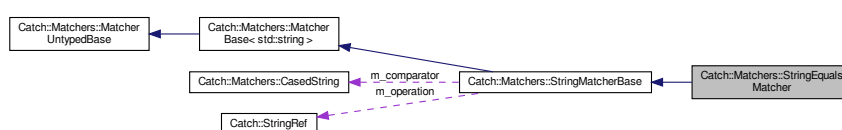
- include/catch2/catch_amalgamated.hpp

5.239 Catch::Matchers::StringEqualsMatcher Class Reference

Inheritance diagram for Catch::Matchers::StringEqualsMatcher:



Collaboration diagram for Catch::Matchers::StringEqualsMatcher:



Public Member Functions

- **StringEqualsMatcher** ([CasedString](#) const &comparator)
- bool **match** (std::string const &source) const override

Additional Inherited Members

The documentation for this class was generated from the following file:

- include/catch2/[catch_amalgamated.hpp](#)

5.240 `Catch::StringMaker< T, typename >` Struct Template Reference

Static Public Member Functions

- `template<typename Fake = T>`
`static std::enable_if_t<!: Catch::Detail::IsStreamInsertable< Fake >::value, std::string > convert (const Fake &value)`
- `template<typename Fake = T>`
`static std::enable_if_t<!: Catch::Detail::IsStreamInsertable< Fake >::value, std::string > convert (const Fake &value)`

The documentation for this struct was generated from the following file:

- `include/catch2/catch_amalgamated.hpp`

5.241 `Catch::StringMaker< bool >` Struct Reference

Static Public Member Functions

- `static std::string convert (bool b)`

The documentation for this struct was generated from the following file:

- `include/catch2/catch_amalgamated.hpp`

5.242 `Catch::StringMaker< Catch::Approx >` Struct Reference

Static Public Member Functions

- `static std::string convert (Catch::Approx const &value)`

The documentation for this struct was generated from the following file:

- `include/catch2/catch_amalgamated.hpp`

5.243 `Catch::StringMaker< char * >` Struct Reference

Static Public Member Functions

- `static std::string convert (char *str)`

The documentation for this struct was generated from the following file:

- `include/catch2/catch_amalgamated.hpp`

5.244 Catch::StringMaker< char > Struct Reference

Static Public Member Functions

- static std::string **convert** (char c)

The documentation for this struct was generated from the following file:

- include/catch2/[catch_amalgamated.hpp](#)

5.245 Catch::StringMaker< char const * > Struct Reference

Static Public Member Functions

- static std::string **convert** (char const *str)

The documentation for this struct was generated from the following file:

- include/catch2/[catch_amalgamated.hpp](#)

5.246 Catch::StringMaker< char[SZ]> Struct Template Reference

Static Public Member Functions

- static std::string **convert** (char const *str)

The documentation for this struct was generated from the following file:

- include/catch2/[catch_amalgamated.hpp](#)

5.247 Catch::StringMaker< double > Struct Reference

Static Public Member Functions

- static std::string **convert** (double value)

Static Public Attributes

- static int **precision**

The documentation for this struct was generated from the following file:

- include/catch2/[catch_amalgamated.hpp](#)

5.248 Catch::StringMaker< float > Struct Reference

Static Public Member Functions

- static std::string **convert** (float value)

Static Public Attributes

- static int **precision**

The documentation for this struct was generated from the following file:

- include/catch2/[catch_amalgamated.hpp](#)

5.249 Catch::StringMaker< int > Struct Reference

Static Public Member Functions

- static std::string **convert** (int value)

The documentation for this struct was generated from the following file:

- include/catch2/[catch_amalgamated.hpp](#)

5.250 Catch::StringMaker< long > Struct Reference

Static Public Member Functions

- static std::string **convert** (long value)

The documentation for this struct was generated from the following file:

- include/catch2/[catch_amalgamated.hpp](#)

5.251 Catch::StringMaker< long long > Struct Reference

Static Public Member Functions

- static std::string **convert** (long long value)

The documentation for this struct was generated from the following file:

- include/catch2/[catch_amalgamated.hpp](#)

5.252 `Catch::StringMaker< R C::* >` Struct Template Reference

Static Public Member Functions

- static std::string **convert** (R C::*p)

The documentation for this struct was generated from the following file:

- include/catch2/[catch_amalgamated.hpp](#)

5.253 `Catch::StringMaker< R, std::enable_if_t< is_range< R >::value &&!::Catch::Detail::IsStreamInsertable< R >::value >>` Struct Template Reference

Static Public Member Functions

- static std::string **convert** (R const &range)

The documentation for this struct was generated from the following file:

- include/catch2/[catch_amalgamated.hpp](#)

5.254 `Catch::StringMaker< signed char >` Struct Reference

Static Public Member Functions

- static std::string **convert** (signed char c)

The documentation for this struct was generated from the following file:

- include/catch2/[catch_amalgamated.hpp](#)

5.255 `Catch::StringMaker< signed char[SZ]>` Struct Template Reference

Static Public Member Functions

- static std::string **convert** (signed char const *str)

The documentation for this struct was generated from the following file:

- include/catch2/[catch_amalgamated.hpp](#)

5.256 Catch::StringMaker< std::chrono::duration< Value, Ratio > > Struct Template Reference

Static Public Member Functions

- static std::string **convert** (std::chrono::duration< Value, Ratio > const &duration)

The documentation for this struct was generated from the following file:

- include/catch2/[catch_amalgamated.hpp](#)

5.257 Catch::StringMaker< std::chrono::duration< Value, std::ratio< 1 > > > Struct Template Reference

Static Public Member Functions

- static std::string **convert** (std::chrono::duration< Value, std::ratio< 1 > > const &duration)

The documentation for this struct was generated from the following file:

- include/catch2/[catch_amalgamated.hpp](#)

5.258 Catch::StringMaker< std::chrono::duration< Value, std::ratio< 3600 > > > Struct Template Reference

Static Public Member Functions

- static std::string **convert** (std::chrono::duration< Value, std::ratio< 3600 > > const &duration)

The documentation for this struct was generated from the following file:

- include/catch2/[catch_amalgamated.hpp](#)

5.259 Catch::StringMaker< std::chrono::duration< Value, std::ratio< 60 > > > Struct Template Reference

Static Public Member Functions

- static std::string **convert** (std::chrono::duration< Value, std::ratio< 60 > > const &duration)

The documentation for this struct was generated from the following file:

- include/catch2/[catch_amalgamated.hpp](#)

5.260 **Catch::StringMaker**< **std::chrono::time_point**< **Clock**, **Duration** > > **Struct Template Reference**

Static Public Member Functions

- static std::string **convert** (std::chrono::time_point< Clock, Duration > const &time_point)

The documentation for this struct was generated from the following file:

- include/catch2/[catch_amalgamated.hpp](#)

5.261 **Catch::StringMaker**< **std::chrono::time_point**< **std::chrono::system_clock**, **Duration** > > **Struct Template Reference**

Static Public Member Functions

- static std::string **convert** (std::chrono::time_point< std::chrono::system_clock, Duration > const &time_point)

The documentation for this struct was generated from the following file:

- include/catch2/[catch_amalgamated.hpp](#)

5.262 **Catch::StringMaker**< **std::nullptr_t** > **Struct Reference**

Static Public Member Functions

- static std::string **convert** (std::nullptr_t)

The documentation for this struct was generated from the following file:

- include/catch2/[catch_amalgamated.hpp](#)

5.263 **Catch::StringMaker**< **std::string** > **Struct Reference**

Static Public Member Functions

- static std::string **convert** (const std::string &str)

The documentation for this struct was generated from the following file:

- include/catch2/[catch_amalgamated.hpp](#)

5.264 Catch::StringMaker< std::wstring > Struct Reference

Static Public Member Functions

- static std::string **convert** (const std::wstring &wstr)

The documentation for this struct was generated from the following file:

- include/catch2/[catch_amalgamated.hpp](#)

5.265 Catch::StringMaker< T * > Struct Template Reference

Static Public Member Functions

- template<typename U >
static std::string **convert** (U *p)

The documentation for this struct was generated from the following file:

- include/catch2/[catch_amalgamated.hpp](#)

5.266 Catch::StringMaker< T[SZ]> Struct Template Reference

Static Public Member Functions

- static std::string **convert** (T const(&arr)[SZ])

The documentation for this struct was generated from the following file:

- include/catch2/[catch_amalgamated.hpp](#)

5.267 Catch::StringMaker< unsigned char > Struct Reference

Static Public Member Functions

- static std::string **convert** (unsigned char c)

The documentation for this struct was generated from the following file:

- include/catch2/[catch_amalgamated.hpp](#)

5.268 Catch::StringMaker< unsigned char[SZ]> Struct Template Reference

Static Public Member Functions

- static std::string **convert** (unsigned char const *str)

The documentation for this struct was generated from the following file:

- include/catch2/[catch_amalgamated.hpp](#)

5.269 Catch::StringMaker< unsigned int > Struct Reference

Static Public Member Functions

- static std::string **convert** (unsigned int value)

The documentation for this struct was generated from the following file:

- include/catch2/[catch_amalgamated.hpp](#)

5.270 Catch::StringMaker< unsigned long > Struct Reference

Static Public Member Functions

- static std::string **convert** (unsigned long value)

The documentation for this struct was generated from the following file:

- include/catch2/[catch_amalgamated.hpp](#)

5.271 Catch::StringMaker< unsigned long long > Struct Reference

Static Public Member Functions

- static std::string **convert** (unsigned long long value)

The documentation for this struct was generated from the following file:

- include/catch2/[catch_amalgamated.hpp](#)

5.272 Catch::StringMaker< wchar_t * > Struct Reference

Static Public Member Functions

- static std::string **convert** (wchar_t *str)

The documentation for this struct was generated from the following file:

- include/catch2/[catch_amalgamated.hpp](#)

5.273 Catch::StringMaker< wchar_t const * > Struct Reference

Static Public Member Functions

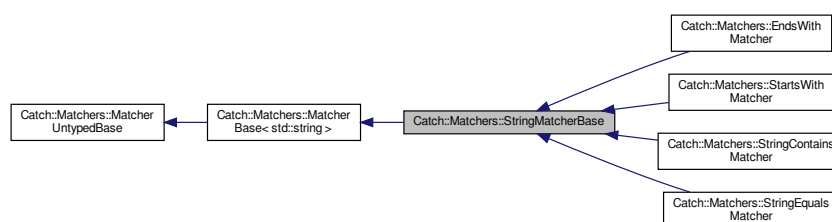
- static std::string **convert** (wchar_t const *str)

The documentation for this struct was generated from the following file:

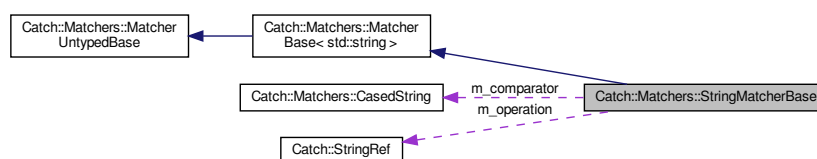
- include/catch2/[catch_amalgamated.hpp](#)

5.274 Catch::Matchers::StringMatcherBase Class Reference

Inheritance diagram for Catch::Matchers::StringMatcherBase:



Collaboration diagram for Catch::Matchers::StringMatcherBase:



Public Member Functions

- **StringMatcherBase** ([StringRef](#) operation, [CasedString](#) const &comparator)
- `std::string describe ()` const override

Protected Attributes

- [CasedString](#) m_comparator
- [StringRef](#) m_operation

Additional Inherited Members

The documentation for this class was generated from the following file:

- include/catch2/catch_amalgamated.hpp

5.275 Catch::StringRef Class Reference

```
#include <catch_amalgamated.hpp>
```

Public Types

- using **size_type** = std::size_t
- using **const_iterator** = const char *

Public Member Functions

- **StringRef** (char const *rawChars) noexcept
- constexpr **StringRef** (char const *rawChars, size_type size) noexcept
- **StringRef** (std::string const &stdString) noexcept
- **operator std::string** () const
- auto **operator==** ([StringRef](#) other) const noexcept -> bool
- auto **operator!=** ([StringRef](#) other) const noexcept -> bool
- constexpr auto **operator[]** (size_type index) const noexcept -> char
- bool **operator<** ([StringRef](#) rhs) const noexcept
- constexpr auto **empty** () const noexcept -> bool
- constexpr auto **size** () const noexcept -> size_type
- constexpr [StringRef](#) **substr** (size_type start, size_type length) const noexcept
- constexpr char const * **data** () const noexcept
- constexpr const_iterator **begin** () const
- constexpr const_iterator **end** () const
- int **compare** ([StringRef](#) rhs) const

Friends

- std::string & **operator+=** (std::string &lhs, [StringRef](#) sr)
- std::ostream & **operator<<** (std::ostream &os, [StringRef](#) sr)
- std::string **operator+** ([StringRef](#) lhs, [StringRef](#) rhs)

5.275.1 Detailed Description

A non-owning string class (similar to the forthcoming `std::string_view`) Note that, because a [StringRef](#) may be a substring of another string, it may not be null terminated.

5.275.2 Member Function Documentation

5.275.2.1 `compare()`

```
int Catch::StringRef::compare (
    StringRef rhs ) const
```

Provides a three-way comparison with rhs

Returns negative number if lhs < rhs, 0 if lhs == rhs, and a positive number if lhs > rhs

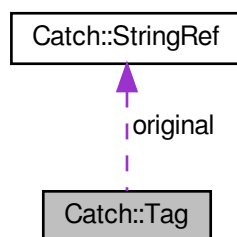
The documentation for this class was generated from the following file:

- include/catch2/catch_amalgamated.hpp

5.276 Catch::Tag Struct Reference

```
#include <catch_amalgamated.hpp>
```

Collaboration diagram for Catch::Tag:



Public Member Functions

- constexpr **Tag** ([StringRef](#) original_)

Public Attributes

- [StringRef](#) **original**

Friends

- bool **operator<** ([Tag](#) const &lhs, [Tag](#) const &rhs)
- bool **operator==** ([Tag](#) const &lhs, [Tag](#) const &rhs)

5.276.1 Detailed Description

A **view** of a tag string that provides case insensitive comparisons

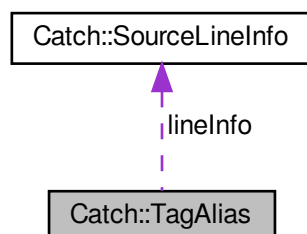
Note that in Catch2 internals, the square brackets around tags are not a part of tag's representation, so e.g. "[cool-tag]" is represented as "cool-tag" internally.

The documentation for this struct was generated from the following file:

- include/catch2/[catch_amalgamated.hpp](#)

5.277 Catch::TagAlias Struct Reference

Collaboration diagram for Catch::TagAlias:



Public Member Functions

- **TagAlias** (std::string const &_tag, [SourceLineInfo](#) _lineInfo)

Public Attributes

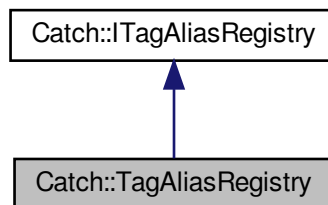
- std::string **tag**
- [SourceLineInfo](#) **lineInfo**

The documentation for this struct was generated from the following file:

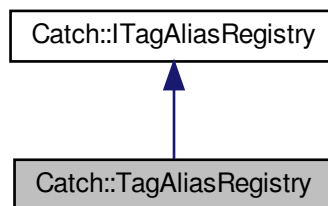
- include/catch2/[catch_amalgamated.hpp](#)

5.278 Catch::TagAliasRegistry Class Reference

Inheritance diagram for Catch::TagAliasRegistry:



Collaboration diagram for Catch::TagAliasRegistry:



Public Member Functions

- [TagAlias](#) const * **find** (std::string const &alias) const override
- std::string **expandAliases** (std::string const &unexpandedTestSpec) const override
- void **add** (std::string const &alias, std::string const &tag, [SourceLineInfo](#) const &lineInfo)

Additional Inherited Members

The documentation for this class was generated from the following file:

- include/catch2/[catch_amalgamated.hpp](#)

5.279 Catch::TagInfo Struct Reference

Public Member Functions

- void **add** ([StringRef](#) spelling)
- std::string **all** () const

Public Attributes

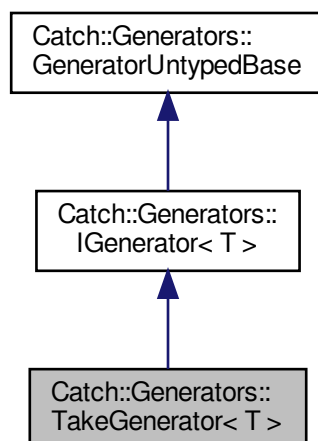
- `std::set< StringRef > spellings`
- `std::size_t count = 0`

The documentation for this struct was generated from the following file:

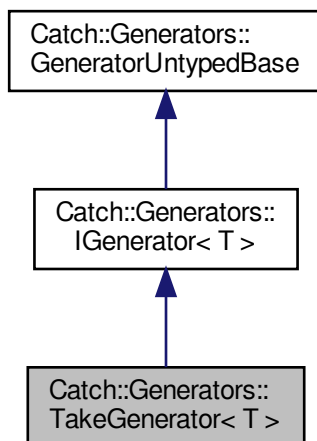
- `include/catch2/catch_amalgamated.hpp`

5.280 `Catch::Generators::TakeGenerator< T >` Class Template Reference

Inheritance diagram for `Catch::Generators::TakeGenerator< T >`:



Collaboration diagram for Catch::Generators::TakeGenerator< T >:



Public Member Functions

- **TakeGenerator** (size_t target, [GeneratorWrapper](#)< T > &&generator)
- T const & **get** () const override
- bool **next** () override

Additional Inherited Members

5.280.1 Member Function Documentation

5.280.1.1 next()

```
template<typename T >
bool Catch::Generators::TakeGenerator< T >::next ( ) [inline], [override], [virtual]
```

Attempts to move the generator to the next element

Returns true iff the move succeeded (and a valid element can be retrieved).

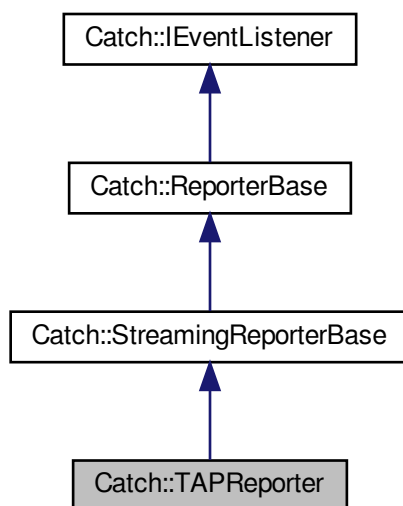
Implements [Catch::Generators::GeneratorUntypedBase](#).

The documentation for this class was generated from the following file:

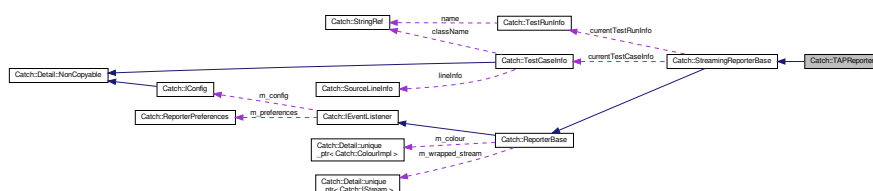
- include/catch2/[catch_amalgamated.hpp](#)

5.281 Catch::TAPReporter Class Reference

Inheritance diagram for Catch::TAPReporter:



Collaboration diagram for Catch::TAPReporter:



Public Member Functions

- **TAPReporter** ([ReporterConfig](#) &&config)
- void **testRunStarting** ([TestRunInfo](#) const &testInfo) override
- void **noMatchingTestCases** ([StringRef](#) unmatchedSpec) override
Called when no test cases match provided test spec.
- void **assertionEnded** ([AssertionStats](#) const &_assertionStats) override
Called after assertion was fully evaluated.
- void **testRunEnded** ([TestRunStats](#) const &_testRunStats) override

Static Public Member Functions

- static std::string **getDescription** ()

Additional Inherited Members

5.281.1 Member Function Documentation

5.281.1.1 testRunEnded()

```
void Catch::TAPReporter::testRunEnded (
    TestRunStats const & testRunStats ) [override], [virtual]
```

Called once after all tests in a testing run are finished

Not called if tests weren't run (e.g. only listings happened)

Reimplemented from [Catch::StreamingReporterBase](#).

5.281.1.2 testRunStarting()

```
void Catch::TAPReporter::testRunStarting (
    TestRunInfo const & testRunInfo ) [override], [virtual]
```

Called once in a testing run before tests are started

Not called if tests won't be run (e.g. only listing will happen)

Reimplemented from [Catch::StreamingReporterBase](#).

The documentation for this class was generated from the following file:

- [include/catch2/catch_amalgamated.hpp](#)

Static Public Member Functions

- static std::string **getDescription** ()

Additional Inherited Members

5.282.1 Member Function Documentation

5.282.1.1 testRunEnded()

```
void Catch::TeamCityReporter::testRunEnded (
    TestRunStats const & testRunStats ) [override], [virtual]
```

Called once after all tests in a testing run are finished

Not called if tests weren't run (e.g. only listings happened)

Reimplemented from [Catch::StreamingReporterBase](#).

5.282.1.2 testRunStarting()

```
void Catch::TeamCityReporter::testRunStarting (
    TestRunInfo const & testRunInfo ) [override], [virtual]
```

Called once in a testing run before tests are started

Not called if tests won't be run (e.g. only listing will happen)

Reimplemented from [Catch::StreamingReporterBase](#).

The documentation for this class was generated from the following file:

- include/catch2/[catch_amalgamated.hpp](#)

5.283 Catch::TestCaseHandle Class Reference

```
#include <catch_amalgamated.hpp>
```

Public Member Functions

- **TestCaseHandle** ([TestCaseInfo](#) *info, [ITestInvoker](#) *invoker)
- void **invoke** () const
- [TestCaseInfo](#) const & **getTestCaseInfo** () const

5.283.1 Detailed Description

Wrapper over the test case information and the test case invoker

Does not own either, and is specifically made to be cheap to copy around.

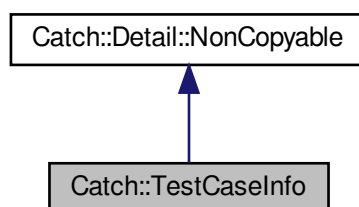
The documentation for this class was generated from the following file:

- include/catch2/catch_amalgamated.hpp

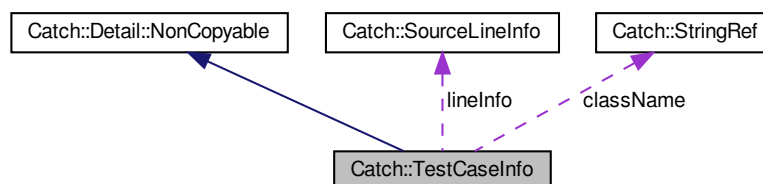
5.284 Catch::TestCaseInfo Struct Reference

```
#include <catch_amalgamated.hpp>
```

Inheritance diagram for Catch::TestCaseInfo:



Collaboration diagram for Catch::TestCaseInfo:



Public Member Functions

- **TestCaseInfo** ([StringRef](#) _className, [NameAndTags](#) const &_tags, [SourceLineInfo](#) const &_lineInfo)
- **bool isHidden** () const
- **bool throws** () const
- **bool okToFail** () const
- **bool expectedToFail** () const
- **void addFilenameTag** ()
- **std::string tagsAsString** () const

Public Attributes

- std::string **name**
- [StringRef](#) **className**
- std::vector< [Tag](#) > **tags**
- [SourceLineInfo](#) **lineInfo**
- TestCaseProperties **properties** = TestCaseProperties::None

Friends

- bool [operator<](#) ([TestCaseInfo](#) const &lhs, [TestCaseInfo](#) const &rhs)
Orders by name, classname and tags.

5.284.1 Detailed Description

Various metadata about the test case.

A test case is uniquely identified by its (class)name and tags combination, with source location being ignored, and other properties being determined from tags.

Tags are kept sorted.

The documentation for this struct was generated from the following file:

- include/catch2/[catch_amalgamated.hpp](#)

5.285 Catch::TestCaseInfoHasher Class Reference

Public Types

- using **hash_t** = std::uint64_t

Public Member Functions

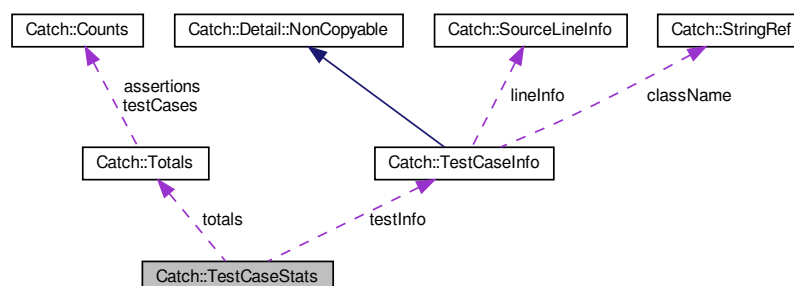
- **TestCaseInfoHasher** (hash_t seed)
- uint32_t **operator()** ([TestCaseInfo](#) const &t) const

The documentation for this class was generated from the following file:

- include/catch2/[catch_amalgamated.hpp](#)

5.286 Catch::TestCaseStats Struct Reference

Collaboration diagram for Catch::TestCaseStats:



Public Member Functions

- **TestCaseStats** ([TestCaseInfo](#) const &_testInfo, [Totals](#) const &_totals, std::string const &_stdOut, std::string const &_stdErr, bool _aborting)

Public Attributes

- [TestCaseInfo](#) const * **testInfo**
- [Totals](#) **totals**
- std::string **stdOut**
- std::string **stdErr**
- bool **aborting**

The documentation for this struct was generated from the following file:

- include/catch2/[catch_amalgamated.hpp](#)

5.287 Catch::TestFailureException Struct Reference

Used to signal that an assertion macro failed.

```
#include <catch_amalgamated.hpp>
```

5.287.1 Detailed Description

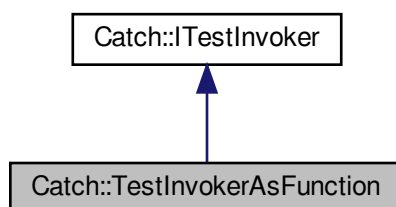
Used to signal that an assertion macro failed.

The documentation for this struct was generated from the following file:

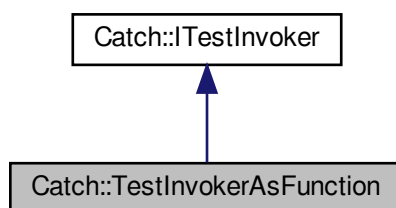
- include/catch2/[catch_amalgamated.hpp](#)

5.288 Catch::TestInvokerAsFunction Class Reference

Inheritance diagram for Catch::TestInvokerAsFunction:



Collaboration diagram for Catch::TestInvokerAsFunction:



Public Member Functions

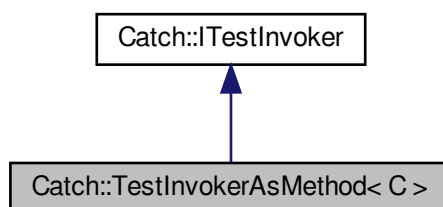
- **TestInvokerAsFunction** (TestType testAsFunction) noexcept
- void **invoke** () const override

The documentation for this class was generated from the following file:

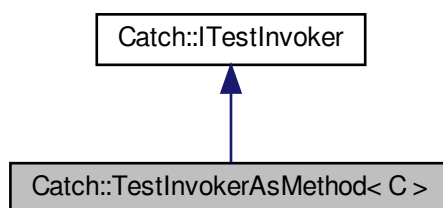
- include/catch2/[catch_amalgamated.hpp](#)

5.289 Catch::TestInvokerAsMethod< C > Class Template Reference

Inheritance diagram for Catch::TestInvokerAsMethod< C >:



Collaboration diagram for Catch::TestInvokerAsMethod< C >:



Public Member Functions

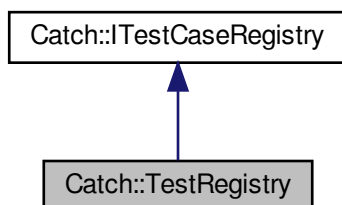
- **TestInvokerAsMethod** (void(C::*testAsMethod)()) noexcept
- void **invoke** () const override

The documentation for this class was generated from the following file:

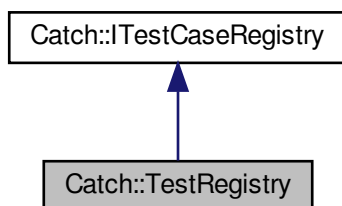
- include/catch2/[catch_amalgamated.hpp](#)

5.290 Catch::TestRegistry Class Reference

Inheritance diagram for Catch::TestRegistry:



Collaboration diagram for Catch::TestRegistry:



Public Member Functions

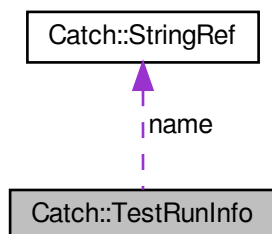
- void **registerTest** ([Detail::unique_ptr](#)< [TestCaseInfo](#) > testInfo, [Detail::unique_ptr](#)< [ITestInvoker](#) > testInvoker)
- [std::vector](#)< [TestCaseInfo](#) * > const & **getAllInfos** () const override
- [std::vector](#)< [TestCaseHandle](#) > const & **getAllTests** () const override
- [std::vector](#)< [TestCaseHandle](#) > const & **getAllTestsSorted** ([IConfig](#) const &config) const override

The documentation for this class was generated from the following file:

- [include/catch2/catch_amalgamated.hpp](#)

5.291 Catch::TestRunInfo Struct Reference

Collaboration diagram for Catch::TestRunInfo:



Public Member Functions

- constexpr **TestRunInfo** ([StringRef](#) _name)

Public Attributes

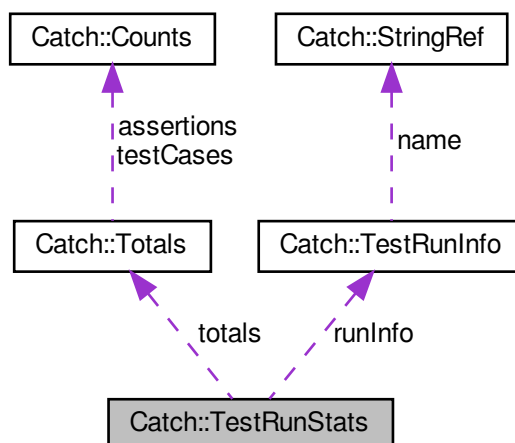
- [StringRef](#) name

The documentation for this struct was generated from the following file:

- include/catch2/[catch_amalgamated.hpp](#)

5.292 Catch::TestRunStats Struct Reference

Collaboration diagram for Catch::TestRunStats:



Public Member Functions

- **TestRunStats** ([TestRunInfo](#) const &_runInfo, [Totals](#) const &_totals, bool _aborting)

Public Attributes

- [TestRunInfo](#) **runInfo**
- [Totals](#) **totals**
- bool **aborting**

The documentation for this struct was generated from the following file:

- include/catch2/[catch_amalgamated.hpp](#)

5.293 Catch::TestSpec Class Reference

Classes

- struct [FilterMatch](#)

Public Types

- using **Matches** = std::vector< [FilterMatch](#) >
- using **vectorStrings** = std::vector< std::string >

Public Member Functions

- bool **hasFilters** () const
- bool **matches** ([TestCaseInfo](#) const &testCase) const
- Matches **matchesByFilter** (std::vector< [TestCaseHandle](#) > const &testCases, [IConfig](#) const &config) const
- const vectorStrings & **getInvalidSpecs** () const

Friends

- class **TestSpecParser**

The documentation for this class was generated from the following file:

- include/catch2/[catch_amalgamated.hpp](#)

5.294 Catch::TestSpecParser Class Reference

Public Member Functions

- **TestSpecParser** ([ITagAliasRegistry](#) const &tagAliases)
- **TestSpecParser** & **parse** (std::string const &arg)
- **TestSpec** **testSpec** ()

The documentation for this class was generated from the following file:

- include/catch2/[catch_amalgamated.hpp](#)

5.295 Catch::Timer Class Reference

Public Member Functions

- void **start** ()
- auto **getElapsedNanoseconds** () const -> uint64_t
- auto **getElapsedMicroseconds** () const -> uint64_t
- auto **getElapsedMilliseconds** () const -> unsigned int
- auto **getElapsedSeconds** () const -> double

The documentation for this class was generated from the following file:

- include/catch2/[catch_amalgamated.hpp](#)

5.296 Catch::Benchmark::Timing< Duration, Result > Struct Template Reference

Public Attributes

- Duration **elapsed**
- Result **result**
- int **iterations**

The documentation for this struct was generated from the following file:

- include/catch2/[catch_amalgamated.hpp](#)

5.297 Catch::Clara::Detail::Token Struct Reference

Public Attributes

- TokenType **type**
- std::string **token**

The documentation for this struct was generated from the following file:

- include/catch2/[catch_amalgamated.hpp](#)

5.298 Catch::Clara::Detail::TokenStream Class Reference

Public Member Functions

- **TokenStream** ([Args](#) const &args)
- **TokenStream** (Iterator it, Iterator itEnd)
- **operator bool** () const
- **size_t count** () const
- **Token operator*** () const
- **Token** const * **operator->** () const
- **TokenStream & operator++** ()

The documentation for this class was generated from the following file:

- include/catch2/catch_amalgamated.hpp

5.299 Tool< TSeq > Class Template Reference

[Tools](#) for defending the agent against the virus.

```
#include <tool-bones.hpp>
```

Public Member Functions

- **Tool** (std::string name="unknown tool")
- void **set_sequence** (TSeq d)
- void **set_sequence_unique** (TSeq d)
- void **set_sequence** (std::shared_ptr< TSeq > d)
- std::shared_ptr< TSeq > **get_sequence** ()
- TSeq & **get_sequence_unique** ()
- void **set_name** (std::string name)
- std::string **get_name** () const
- [Agent](#)< TSeq > * **get_agent** ()
- int **get_id** () const
- void **set_id** (int id)
- void **set_date** (int d)
- int **get_date** () const
- void **set_status** (epiworld_fast_int init, epiworld_fast_int post)
- void **set_queue** (epiworld_fast_int init, epiworld_fast_int post)
- void **get_status** (epiworld_fast_int *init, epiworld_fast_int *post)
- void **get_queue** (epiworld_fast_int *init, epiworld_fast_int *post)

Get and set the tool functions

Parameters

v	<i>The virus over which to operate</i>
fun	<i>the function to be used</i>

Returns

epiworld_double

- *epiworld_double* **get_susceptibility_reduction** (VirusPtr< TSeq > v)
- *epiworld_double* **get_transmission_reduction** (VirusPtr< TSeq > v)
- *epiworld_double* **get_recovery_enhancer** (VirusPtr< TSeq > v)
- *epiworld_double* **get_death_reduction** (VirusPtr< TSeq > v)
- void **set_susceptibility_reduction_fun** (ToolFun< TSeq > fun)
- void **set_transmission_reduction_fun** (ToolFun< TSeq > fun)
- void **set_recovery_enhancer_fun** (ToolFun< TSeq > fun)
- void **set_death_reduction_fun** (ToolFun< TSeq > fun)
- void **set_susceptibility_reduction** (*epiworld_double* *prob)
- void **set_transmission_reduction** (*epiworld_double* *prob)
- void **set_recovery_enhancer** (*epiworld_double* *prob)
- void **set_death_reduction** (*epiworld_double* *prob)
- void **set_susceptibility_reduction** (*epiworld_double* prob)
- void **set_transmission_reduction** (*epiworld_double* prob)
- void **set_recovery_enhancer** (*epiworld_double* prob)
- void **set_death_reduction** (*epiworld_double* prob)

Friends

- class **Agent**< TSeq >
- class **Model**< TSeq >
- void **default_add_virus** ([Action](#)< TSeq > &a, [Model](#)< TSeq > *m)
- void **default_add_tool** ([Action](#)< TSeq > &a, [Model](#)< TSeq > *m)
- void **default_rm_virus** ([Action](#)< TSeq > &a, [Model](#)< TSeq > *m)
- void **default_rm_tool** ([Action](#)< TSeq > &a, [Model](#)< TSeq > *m)

5.299.1 Detailed Description

```
template<typename TSeq = int>
class Tool< TSeq >
```

[Tools](#) for defending the agent against the virus.

Template Parameters

<i>TSeq</i>	Type of sequence
-------------	------------------

The documentation for this class was generated from the following files:

- include/epiworld/agent-bones.hpp
- include/epiworld/tool-bones.hpp
- include/epiworld/tool-meat.hpp

5.300 Tools< TSeq > Class Template Reference

Set of tools (useful for building iterators)

```
#include <tools-bones.hpp>
```

Public Member Functions

- **Tools** ([Agent](#)< TSeq > &p)
- std::vector< ToolPtr< TSeq > >::iterator **begin** ()
- std::vector< ToolPtr< TSeq > >::iterator **end** ()
- ToolPtr< TSeq > & **operator**() (size_t i)
- ToolPtr< TSeq > & **operator**[] (size_t i)
- size_t **size** () const noexcept

Friends

- class **Tool**< TSeq >
- class **Agent**< TSeq >

5.300.1 Detailed Description

```
template<typename TSeq>
class Tools< TSeq >
```

Set of tools (useful for building iterators)

Template Parameters

<i>TSeq</i>	
-------------	--

The documentation for this class was generated from the following files:

- include/epiworld/agent-bones.hpp
- include/epiworld/tools-bones.hpp

5.301 Tools_const< TSeq > Class Template Reference

Set of [Tools](#) (const) (useful for iterators)

```
#include <tools-bones.hpp>
```

Public Member Functions

- **Tools_const** (const [Agent](#)< TSeq > &p)
- std::vector< ToolPtr< TSeq > >::const_iterator **begin** ()
- std::vector< ToolPtr< TSeq > >::const_iterator **end** ()
- const ToolPtr< TSeq > & **operator**() (size_t i)
- const ToolPtr< TSeq > & **operator**[] (size_t i)
- size_t **size** () const noexcept

Friends

- class **Tool**< TSeq >
- class **Agent**< TSeq >

5.301.1 Detailed Description

```
template<typename TSeq>
class Tools_const< TSeq >
```

Set of [Tools](#) (const) (useful for iterators)

Template Parameters

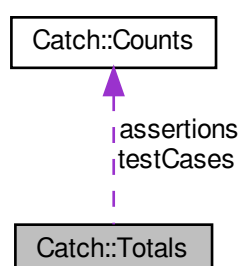
<i>TSeq</i>	
-------------	--

The documentation for this class was generated from the following files:

- include/epiworld/agent-bones.hpp
- include/epiworld/tools-bones.hpp

5.302 Catch::Totals Struct Reference

Collaboration diagram for Catch::Totals:



Public Member Functions

- [Totals](#) **operator-** ([Totals](#) const &other) const
- [Totals](#) & **operator+=** ([Totals](#) const &other)
- [Totals](#) **delta** ([Totals](#) const &prevTotals) const

Public Attributes

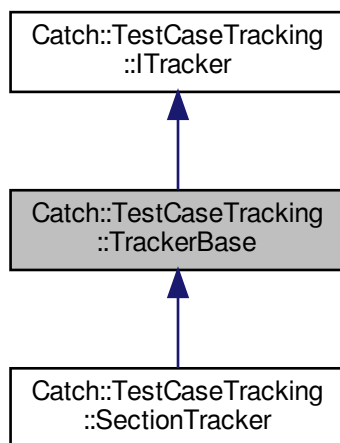
- [Counts](#) assertions
- [Counts](#) testCases

The documentation for this struct was generated from the following file:

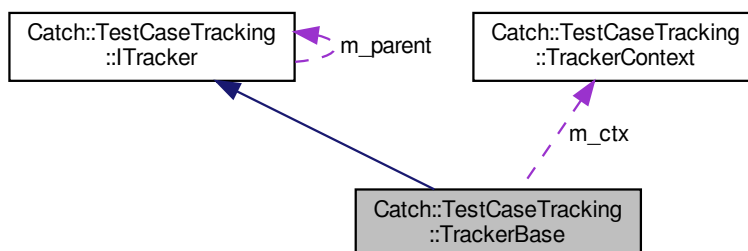
- include/catch2/catch_amalgamated.hpp

5.303 Catch::TestCaseTracking::TrackerBase Class Reference

Inheritance diagram for Catch::TestCaseTracking::TrackerBase:



Collaboration diagram for Catch::TestCaseTracking::TrackerBase:



Public Member Functions

- **TrackerBase** ([NameAndLocation](#) const &nameAndLocation, [TrackerContext](#) &ctx, [ITracker](#) *parent)
- bool **isComplete** () const override
Returns true if tracker run to completion (successfully or not)
- void **open** ()
- void **close** () override
- void **fail** () override

Protected Attributes

- [TrackerContext](#) & **m_ctx**

Additional Inherited Members

The documentation for this class was generated from the following file:

- include/catch2/[catch_amalgamated.hpp](#)

5.304 Catch::TestCaseTracking::TrackerContext Class Reference

Public Member Functions

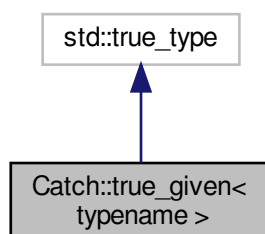
- [ITracker](#) & **startRun** ()
- void **endRun** ()
- void **startCycle** ()
- void **completeCycle** ()
- bool **completedCycle** () const
- [ITracker](#) & **currentTracker** ()
- void **setCurrentTracker** ([ITracker](#) *tracker)

The documentation for this class was generated from the following file:

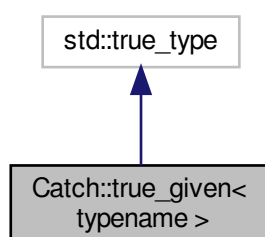
- include/catch2/[catch_amalgamated.hpp](#)

5.305 Catch::true_given< typename > Struct Template Reference

Inheritance diagram for Catch::true_given< typename >:



Collaboration diagram for Catch::true_given< typename >:



The documentation for this struct was generated from the following file:

- include/catch2/[catch_amalgamated.hpp](#)

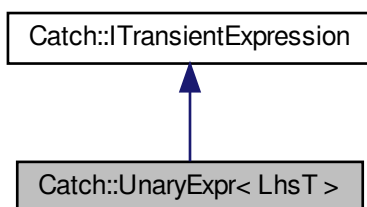
5.306 Catch::Benchmark::Detail::CompleteType< void >::type Struct Reference

The documentation for this struct was generated from the following file:

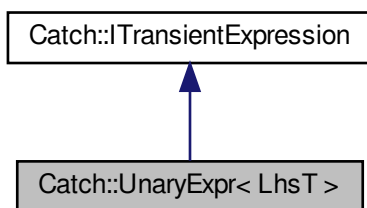
- include/catch2/[catch_amalgamated.hpp](#)

5.307 Catch::UnaryExpr< LhsT > Class Template Reference

Inheritance diagram for Catch::UnaryExpr< LhsT >:



Collaboration diagram for Catch::UnaryExpr< LhsT >:



Public Member Functions

- **UnaryExpr** (LhsT lhs)

The documentation for this class was generated from the following file:

- include/catch2/[catch_amalgamated.hpp](#)

5.308 Catch::Clara::Detail::UnaryLambdaTraits< L > Struct Template Reference

The documentation for this struct was generated from the following file:

- include/catch2/[catch_amalgamated.hpp](#)

5.309 Catch::Clara::Detail::UnaryLambdaTraits< ReturnT(ClassT::*)(Args...) const > Struct Template Reference

Static Public Attributes

- static const bool **isValid** = false

The documentation for this struct was generated from the following file:

- include/catch2/[catch_amalgamated.hpp](#)

5.310 Catch::Clara::Detail::UnaryLambdaTraits< ReturnT(ClassT::*)(ArgT) const > Struct Template Reference

Public Types

- using **ArgType** = std::remove_const_t< std::remove_reference_t< ArgT > >
- using **ReturnType** = ReturnT

Static Public Attributes

- static const bool **isValid** = true

The documentation for this struct was generated from the following file:

- include/catch2/[catch_amalgamated.hpp](#)

5.311 Catch::Detail::unique_ptr< T > Class Template Reference

```
#include <catch_amalgamated.hpp>
```

Public Member Functions

- constexpr **unique_ptr** (std::nullptr_t=nullptr)
- constexpr **unique_ptr** (T *ptr)
- template<typename U , typename = std::enable_if_t<std::is_base_of<T, U>::value>> **unique_ptr** ([unique_ptr](#)< U > &&from)
- template<typename U , typename = std::enable_if_t<std::is_base_of<T, U>::value>> **unique_ptr** & **operator=** ([unique_ptr](#)< U > &&from)
- **unique_ptr** ([unique_ptr](#) const &)=delete
- [unique_ptr](#) & **operator=** ([unique_ptr](#) const &)=delete
- **unique_ptr** ([unique_ptr](#) &&rhs) noexcept
- [unique_ptr](#) & **operator=** ([unique_ptr](#) &&rhs) noexcept
- T & **operator*** ()
- T const & **operator*** () const
- T * **operator->** () noexcept
- T const * **operator->** () const noexcept
- T * **get** ()
- T const * **get** () const
- void **reset** (T *ptr=nullptr)
- T * **release** ()
- **operator bool** () const

Friends

- void **swap** ([unique_ptr](#) &lhs, [unique_ptr](#) &rhs)

5.311.1 Detailed Description

```
template<typename T>
class Catch::Detail::unique_ptr< T >
```

A reimplementation of `std::unique_ptr` for improved compilation performance

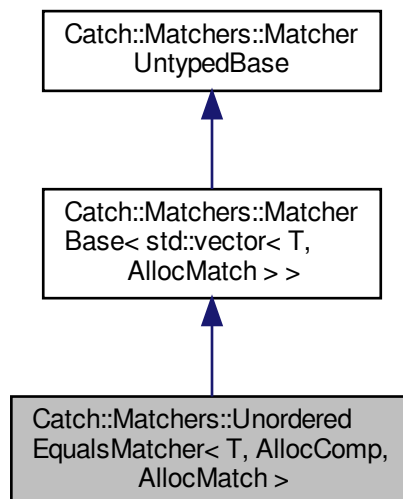
Does not support arrays nor custom deleters.

The documentation for this class was generated from the following file:

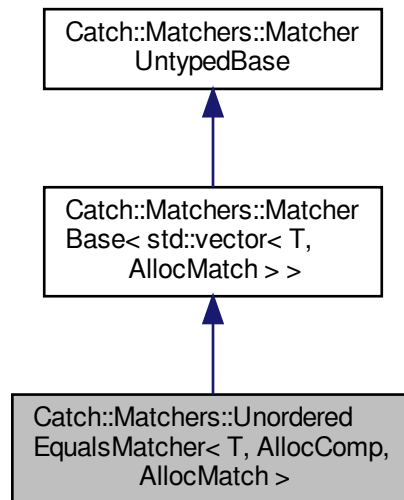
- include/catch2/[catch_amalgamated.hpp](#)

5.312 Catch::Matchers::UnorderedEqualsMatcher< T, AllocComp, AllocMatch > Class Template Reference

Inheritance diagram for Catch::Matchers::UnorderedEqualsMatcher< T, AllocComp, AllocMatch >:



Collaboration diagram for Catch::Matchers::UnorderedEqualsMatcher< T, AllocComp, AllocMatch >:



Public Member Functions

- **UnorderedEqualsMatcher** (std::vector< T, AllocComp > const &target)
- bool **match** (std::vector< T, AllocMatch > const &vec) const override
- std::string **describe** () const override

Additional Inherited Members

The documentation for this class was generated from the following file:

- include/catch2/[catch_amalgamated.hpp](#)

5.313 UserData< TSeq > Class Template Reference

Personalized data by the user.

```
#include <userdata-bones.hpp>
```

Public Member Functions

- **UserData** ([Model](#)< TSeq > &m)
- **UserData** (std::vector< std::string > names)
Construct a new User Data object.
- std::vector< std::string > & **get_names** ()
- std::vector< int > & **get_dates** ()
- std::vector< epiworld_double > & **get_data** ()
- void **get_all** (std::vector< std::string > *names=nullptr, std::vector< int > *date=nullptr, std::vector< epiworld_double > *data=nullptr)
- unsigned int **nrow** () const
- unsigned int **ncol** () const
- void **write** (std::string fn)
- void **print** () const

Append data

Parameters

x	A vector of length <code>ncol()</code> (if vector), otherwise a <code>epiworld_double</code> .
j	Index of the data point, from 0 to <code>ncol() - 1</code> .

- void **add** (std::vector< epiworld_double > x)
- void **add** (unsigned int j, epiworld_double x)

Access data

Parameters

i	Row (0 through <code>ndays - 1</code> .)
j	Column (0 through <code>ncols()</code>).

Returns

`epiworld_double&`

- `epiworld_double &operator()` (unsigned int i, unsigned int j)
- `epiworld_double &operator()` (unsigned int i, std::string name)

Friends

- class **Model**< TSeq >
- class **DataBase**< TSeq >

5.313.1 Detailed Description

```
template<typename TSeq>
class UserData< TSeq >
```

Personalized data by the user.

Template Parameters

<i>TSeq</i>	
-------------	--

5.313.2 Constructor & Destructor Documentation

5.313.2.1 UserData()

```
template<typename TSeq >
UserData< TSeq >::UserData (
    std::vector< std::string > names ) [inline]
```

Construct a new User Data object.

Parameters

<i>names</i>	A vector of names. The length of the vector sets the number of columns to record.
--------------	---

The documentation for this class was generated from the following files:

- include/epiworld/database-bones.hpp
- include/epiworld/userdata-bones.hpp
- include/epiworld/userdata-meat.hpp

5.314 vecHasher< T > Struct Template Reference

Vector hasher.

```
#include <misc.hpp>
```

Public Member Functions

- `std::size_t operator() (std::vector< T > const &dat) const` noexcept

5.314.1 Detailed Description

```
template<typename T>
struct vecHasher< T >
```

Vector hasher.

Template Parameters

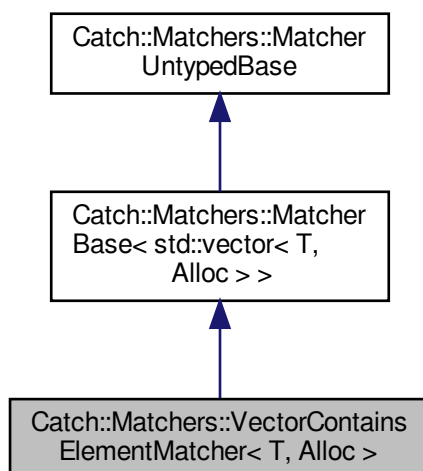
<i>T</i>	
----------	--

The documentation for this struct was generated from the following file:

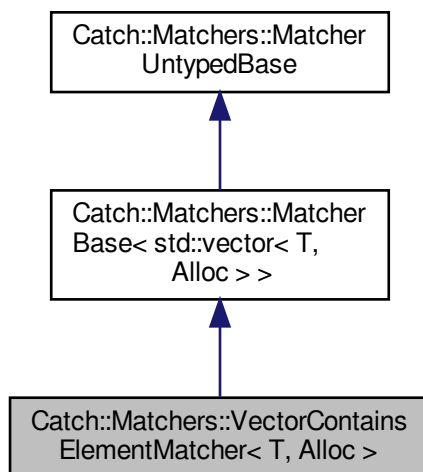
- include/epiworld/misc.hpp

5.315 Catch::Matchers::VectorContainsElementMatcher< T, Alloc > Class Template Reference

Inheritance diagram for Catch::Matchers::VectorContainsElementMatcher< T, Alloc >:



Collaboration diagram for `Catch::Matchers::VectorContainsElementMatcher< T, Alloc >`:



Public Member Functions

- **VectorContainsElementMatcher** (T const &comparator)
- bool **match** (std::vector< T, Alloc > const &v) const override
- std::string **describe** () const override

Additional Inherited Members

The documentation for this class was generated from the following file:

- include/catch2/[catch_amalgamated.hpp](#)

5.316 Catch::Version Struct Reference

Public Member Functions

- **Version** ([Version](#) const &)=delete
- [Version](#) & **operator=** ([Version](#) const &)=delete
- **Version** (unsigned int _majorVersion, unsigned int _minorVersion, unsigned int _patchNumber, char const *const _branchName, unsigned int _buildNumber)

Public Attributes

- unsigned int const **majorVersion**
- unsigned int const **minorVersion**
- unsigned int const **patchNumber**
- char const *const **branchName**
- unsigned int const **buildNumber**

Friends

- `std::ostream & operator<< (std::ostream &os, Version const &version)`

The documentation for this struct was generated from the following file:

- `include/catch2/catch_amalgamated.hpp`

5.317 `Virus< TSeq >` Class Template Reference

[Virus](#).

```
#include <virus-bones.hpp>
```

Public Member Functions

- **Virus** (`std::string name="unknown virus"`)
- void **mutate** ()
- void **set_mutation** (`MutFun< TSeq > fun`)
- const `TSeq *` **get_sequence** ()
- void **set_sequence** (`TSeq sequence`)
- [Agent](#)< `TSeq` > * **get_agent** ()
- void **set_agent** ([Agent](#)< `TSeq` > *p, `epiworld_fast_uint idx`)
- [Model](#)< `TSeq` > * **get_model** ()
- void **set_date** (`int d`)
- int **get_date** () const
- void **set_id** (`int idx`)
- int **get_id** () const
- void **set_name** (`std::string name`)
- `std::string` **get_name** () const
- `std::vector< epiworld_double > &` **get_data** ()

Get and set the tool functions

Parameters

v	<i>The virus over which to operate</i>
fun	<i>the function to be used</i>

Returns

epiworld_double

- `epiworld_double` **get_prob_infecting** ()
- `epiworld_double` **get_prob_recovery** ()
- `epiworld_double` **get_prob_death** ()
- void **post_recovery** ()
- void **set_post_recovery** (`PostRecoveryFun< TSeq > fun`)
- void **set_post_immunity** (`epiworld_double prob`)
- void **set_post_immunity** (`epiworld_double *prob`)
- void **set_prob_infecting_fun** (`VirusFun< TSeq > fun`)

- void **set_prob_recovery_fun** (VirusFun< TSeq > fun)
- void **set_prob_death_fun** (VirusFun< TSeq > fun)
- void **set_prob_infecting** (epiworld_double *prob)
- void **set_prob_recovery** (epiworld_double *prob)
- void **set_prob_death** (epiworld_double *prob)
- void **set_prob_infecting** (epiworld_double prob)
- void **set_prob_recovery** (epiworld_double prob)
- void **set_prob_death** (epiworld_double prob)

Get and set the status and queue

After applied, viruses can change the status and affect the queue of agents. These function sets the default values, which are retrieved when adding or removing a virus does not specify a change in status or in queue.

Parameters

init	After the virus/tool is added to the agent.
end	After the virus/tool is removed.
removed	After the agent (Agent) is removed.

- void **set_status** (epiworld_fast_int init, epiworld_fast_int end, epiworld_fast_int removed=-99)
- void **set_queue** (epiworld_fast_int init, epiworld_fast_int end, epiworld_fast_int removed=-99)
- void **get_status** (epiworld_fast_int *init, epiworld_fast_int *end, epiworld_fast_int *removed=-99)
- void **get_queue** (epiworld_fast_int *init, epiworld_fast_int *end, epiworld_fast_int *removed=-99)

Friends

- class **Agent**< TSeq >
- class **Model**< TSeq >
- class **DataBase**< TSeq >
- void **default_add_virus** ([Action](#)< TSeq > &a, [Model](#)< TSeq > *m)
- void **default_add_tool** ([Action](#)< TSeq > &a, [Model](#)< TSeq > *m)
- void **default_rm_virus** ([Action](#)< TSeq > &a, [Model](#)< TSeq > *m)
- void **default_rm_tool** ([Action](#)< TSeq > &a, [Model](#)< TSeq > *m)

5.317.1 Detailed Description

```
template<typename TSeq = int>
class Virus< TSeq >
```

[Virus](#).

Template Parameters

<i>TSeq</i>	
-------------	--

Raw transmissibility of a virus should be a function of its genetic sequence. Nonetheless, transmissibility can be reduced as a result of having one or more tools to fight the virus. Because of this, transmissibility should be a function of the agent.

The documentation for this class was generated from the following files:

- include/epiworld/agent-bones.hpp
- include/epiworld/virus-bones.hpp
- include/epiworld/virus-meat.hpp

5.318 Viruses< TSeq > Class Template Reference

Set of viruses (useful for building iterators)

```
#include <viruses-bones.hpp>
```

Public Member Functions

- **Viruses** ([Agent](#)< TSeq > &p)
- std::vector< VIRUSPTR >::iterator **begin** ()
- std::vector< VIRUSPTR >::iterator **end** ()
- VIRUSPTR & **operator**() (size_t i)
- VIRUSPTR & **operator**[] (size_t i)
- size_t **size** () const noexcept

Friends

- class **Virus**< TSeq >
- class **Agent**< TSeq >

5.318.1 Detailed Description

```
template<typename TSeq>
class Viruses< TSeq >
```

Set of viruses (useful for building iterators)

Template Parameters

<i>TSeq</i>	
-------------	--

The documentation for this class was generated from the following files:

- include/epiworld/agent-bones.hpp
- include/epiworld/viruses-bones.hpp

5.319 Viruses_const< TSeq > Class Template Reference

Set of [Viruses](#) (const) (useful for iterators)

```
#include <viruses-bones.hpp>
```

Public Member Functions

- **Viruses_const** (const [Agent](#)< TSeq > &p)
- std::vector< VIRUSPTR >::const_iterator **begin** ()
- std::vector< VIRUSPTR >::const_iterator **end** ()
- const VIRUSPTR & **operator()** (size_t i)
- const VIRUSPTR & **operator[]** (size_t i)
- size_t **size** () const noexcept

Friends

- class **Virus**< TSeq >
- class **Agent**< TSeq >

5.319.1 Detailed Description

```
template<typename TSeq>
class Viruses_const< TSeq >
```

Set of [Viruses](#) (const) (useful for iterators)

Template Parameters

<i>TSeq</i>	
-------------	--

The documentation for this class was generated from the following files:

- include/epiworld/agent-bones.hpp
- include/epiworld/viruses-bones.hpp

5.320 Catch::WaitForKeypress Struct Reference

Public Types

- enum **When** { **Never** , **BeforeStart** = 1 , **BeforeExit** = 2 , **BeforeStartAndExit** = BeforeStart | BeforeExit }

The documentation for this struct was generated from the following file:

- include/catch2/[catch_amalgamated.hpp](#)

5.321 Catch::WarnAbout Struct Reference

Public Types

- enum [What](#) { **Nothing** = 0x00 , **NoAssertions** = 0x01 , **UnmatchedTestSpec** = 0x02 }

5.321.1 Member Enumeration Documentation

5.321.1.1 What

```
enum Catch::WarnAbout::What
```

Enumerator

NoAssertions	A test case or leaf section did not run any assertions.
UnmatchedTestSpec	A command line test spec matched no test cases.

The documentation for this struct was generated from the following file:

- [include/catch2/catch_amalgamated.hpp](#)

5.322 Catch::WildcardPattern Class Reference

Public Member Functions

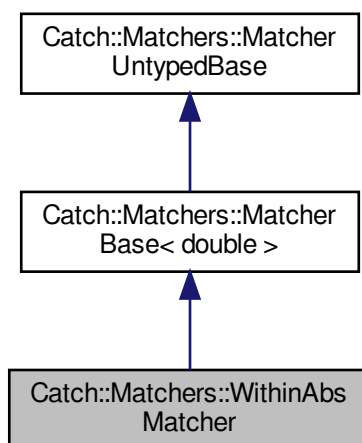
- **WildcardPattern** (std::string const &pattern, CaseSensitive caseSensitivity)
- bool **matches** (std::string const &str) const

The documentation for this class was generated from the following file:

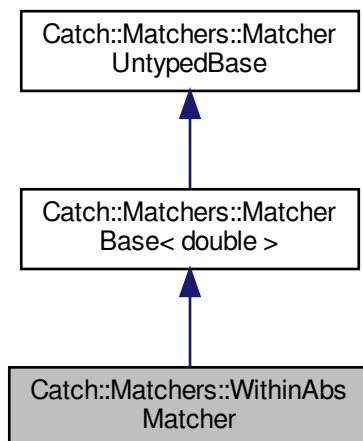
- [include/catch2/catch_amalgamated.hpp](#)

5.323 Catch::Matchers::WithinAbsMatcher Class Reference

Inheritance diagram for Catch::Matchers::WithinAbsMatcher:



Collaboration diagram for Catch::Matchers::WithinAbsMatcher:



Public Member Functions

- **WithinAbsMatcher** (double target, double margin)
- bool **match** (double const &matchee) const override
- std::string **describe** () const override

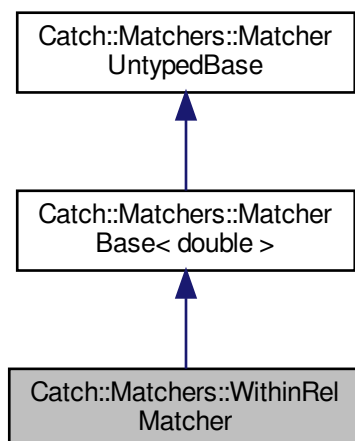
Additional Inherited Members

The documentation for this class was generated from the following file:

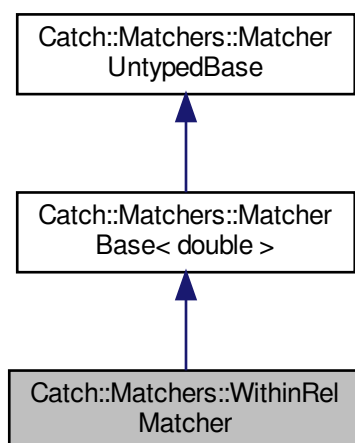
- include/catch2/catch_amalgamated.hpp

5.324 Catch::Matchers::WithinRelMatcher Class Reference

Inheritance diagram for Catch::Matchers::WithinRelMatcher:



Collaboration diagram for Catch::Matchers::WithinRelMatcher:



Public Member Functions

- **WithinRelMatcher** (double target, double epsilon)
- bool **match** (double const &matchee) const override
- std::string **describe** () const override

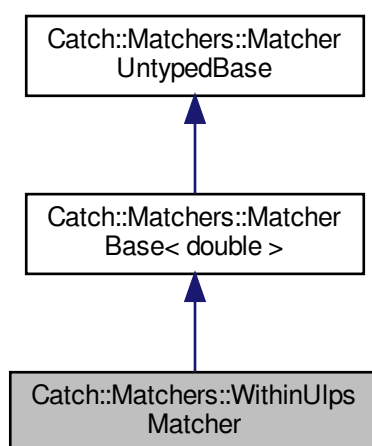
Additional Inherited Members

The documentation for this class was generated from the following file:

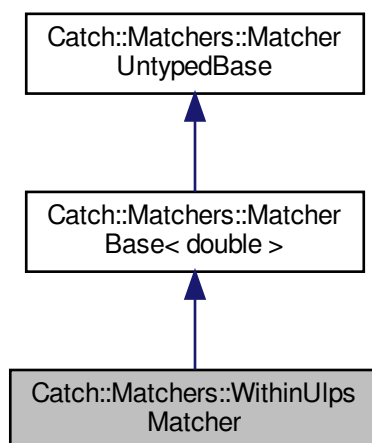
- [include/catch2/catch_amalgamated.hpp](#)

5.325 Catch::Matchers::WithinUlpMatcher Class Reference

Inheritance diagram for Catch::Matchers::WithinUlpMatcher:



Collaboration diagram for Catch::Matchers::WithinUlpMatcher:



Public Member Functions

- **WithinUlpsMatcher** (double target, uint64_t ulps, Detail::FloatingPointKind baseType)
- bool **match** (double const &matchee) const override
- std::string **describe** () const override

Additional Inherited Members

The documentation for this class was generated from the following file:

- include/catch2/[catch_amalgamated.hpp](#)

5.326 Catch::XmlEncode Class Reference

```
#include <catch_amalgamated.hpp>
```

Public Types

- enum **ForWhat** { **ForTextNodes** , **ForAttributes** }

Public Member Functions

- **XmlEncode** ([StringRef](#) str, ForWhat forWhat=ForTextNodes)
- void **encodeTo** (std::ostream &os) const

Friends

- std::ostream & **operator**<< (std::ostream &os, [XmlEncode](#) const &xmlEncode)

5.326.1 Detailed Description

Helper for XML-encoding text (escaping angle brackets, quotes, etc)

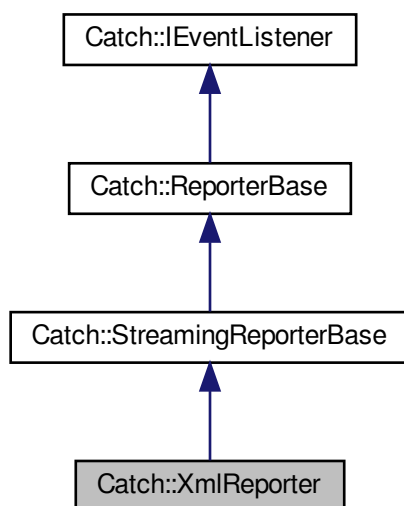
Note: doesn't take ownership of passed strings, and thus the encoded string must outlive the encoding instance.

The documentation for this class was generated from the following file:

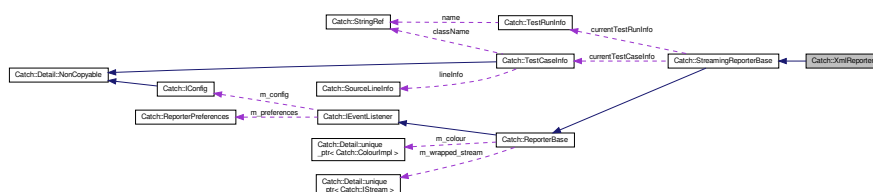
- include/catch2/[catch_amalgamated.hpp](#)

5.327 Catch::XmlReporter Class Reference

Inheritance diagram for Catch::XmlReporter:



Collaboration diagram for Catch::XmlReporter:



Public Member Functions

- **XmlReporter** ([ReporterConfig](#) &&_config)
- virtual std::string **getStylesheetRef** () const
- void **writeSourceInfo** ([SourceLineInfo](#) const &sourceInfo)
- void **testRunStarting** ([TestRunInfo](#) const &testInfo) override
- void **testCaseStarting** ([TestCaseInfo](#) const &testInfo) override

Called once for each TEST_CASE, no matter how many times it is entered.
- void **sectionStarting** ([SectionInfo](#) const §ionInfo) override

Called when a SECTION is being entered. Not called for skipped sections.
- void **assertionStarting** ([AssertionInfo](#) const &) override

Called before assertion success/failure is evaluated.
- void **assertionEnded** ([AssertionStats](#) const &assertionStats) override

Called after assertion was fully evaluated.

- void [sectionEnded](#) ([SectionStats](#) const §ionStats) override
Called after a `SECTION` has finished running.
- void [testCaseEnded](#) ([TestCaseStats](#) const &testCaseStats) override
Called once for each `TEST_CASE`, no matter how many times it is entered.
- void [testRunEnded](#) ([TestRunStats](#) const &testRunStats) override
- void [benchmarkPreparing](#) ([StringRef](#) name) override
Called when user-code is being probed before the actual benchmark runs.
- void [benchmarkStarting](#) ([BenchmarkInfo](#) const &) override
Called after probe but before the user-code is being benchmarked.
- void [benchmarkEnded](#) ([BenchmarkStats](#)<> const &) override
Called with the benchmark results if benchmark successfully finishes.
- void [benchmarkFailed](#) ([StringRef](#) error) override
Called if running the benchmarks fails for any reason.
- void [listReporters](#) (std::vector< [ReporterDescription](#) > const &descriptions) override
- void [listListeners](#) (std::vector< [ListenerDescription](#) > const &descriptions) override
- void [listTests](#) (std::vector< [TestCaseHandle](#) > const &tests) override
- void [listTags](#) (std::vector< [TagInfo](#) > const &tags) override

Static Public Member Functions

- static std::string [getDescription](#) ()

Additional Inherited Members

5.327.1 Member Function Documentation

5.327.1.1 listListeners()

```
void Catch::XmlReporter::listListeners (
    std::vector< ListenerDescription > const & descriptions ) [override], [virtual]
```

Provides a simple default listing of listeners

Looks similarly to listing of reporters, but with listener type instead of reporter name.

Reimplemented from [Catch::ReporterBase](#).

5.327.1.2 listReporters()

```
void Catch::XmlReporter::listReporters (
    std::vector< ReporterDescription > const & descriptions ) [override], [virtual]
```

Provides a simple default listing of reporters.

Should look roughly like the reporter listing in v2 and earlier versions of Catch2.

Reimplemented from [Catch::ReporterBase](#).

5.327.1.3 listTags()

```
void Catch::XmlReporter::listTags (
    std::vector< TagInfo > const & tags ) [override], [virtual]
```

Provides a simple default listing of tags.

Should look roughly like the tag listing in v2 and earlier versions of Catch2.

Reimplemented from [Catch::ReporterBase](#).

5.327.1.4 listTests()

```
void Catch::XmlReporter::listTests (
    std::vector< TestCaseHandle > const & tests ) [override], [virtual]
```

Provides a simple default listing of tests.

Should look roughly like the test listing in v2 and earlier versions of Catch2. Especially supports low-verbosity listing that mimics the old `--list-test-names-only` output.

Reimplemented from [Catch::ReporterBase](#).

5.327.1.5 testRunEnded()

```
void Catch::XmlReporter::testRunEnded (
    TestRunStats const & testRunStats ) [override], [virtual]
```

Called once after all tests in a testing run are finished

Not called if tests weren't run (e.g. only listings happened)

Reimplemented from [Catch::StreamingReporterBase](#).

5.327.1.6 testRunStarting()

```
void Catch::XmlReporter::testRunStarting (
    TestRunInfo const & testRunInfo ) [override], [virtual]
```

Called once in a testing run before tests are started

Not called if tests won't be run (e.g. only listing will happen)

Reimplemented from [Catch::StreamingReporterBase](#).

The documentation for this class was generated from the following file:

- `include/catch2/catch_amalgamated.hpp`

5.328 Catch::XmlWriter Class Reference

Classes

- class [ScopedElement](#)

Public Member Functions

- **XmlWriter** (std::ostream &os)
- **XmlWriter** ([XmlWriter](#) const &)=delete
- **XmlWriter** & **operator=** ([XmlWriter](#) const &)=delete
- **XmlWriter** & **startElement** (std::string const &name, XmlFormatting fmt=XmlFormatting::Newline|XmlFormatting::Indent)
- [ScopedElement](#) **scopedElement** (std::string const &name, XmlFormatting fmt=XmlFormatting::Newline|XmlFormatting::Indent)
- **XmlWriter** & **endElement** (XmlFormatting fmt=XmlFormatting::Newline|XmlFormatting::Indent)
- **XmlWriter** & **writeAttribute** ([StringRef](#) name, [StringRef](#) attribute)
The attribute content is XML-encoded.
- **XmlWriter** & **writeAttribute** ([StringRef](#) name, bool attribute)
Writes the attribute as "true/false".
- **XmlWriter** & **writeAttribute** ([StringRef](#) name, char const *attribute)
The attribute content is XML-encoded.
- template<typename T, typename = typename std::enable_if_t< !std::is_convertible<T, [StringRef](#)>::value>>
XmlWriter & **writeAttribute** ([StringRef](#) name, T const &attribute)
- **XmlWriter** & **writeText** ([StringRef](#) text, XmlFormatting fmt=XmlFormatting::Newline|XmlFormatting::Indent)
Writes escaped text in a element.
- **XmlWriter** & **writeComment** ([StringRef](#) text, XmlFormatting fmt=XmlFormatting::Newline|XmlFormatting::Indent)
Writes XML comment as "<!-- text -->".
- void **writeStylesheetRef** ([StringRef](#) url)
- void **ensureTagClosed** ()

5.328.1 Member Function Documentation

5.328.1.1 writeAttribute()

```
template<typename T, typename = typename std::enable_if_t< !std::is_convertible<T, StringRef>::value>>
XmlWriter& Catch::XmlWriter::writeAttribute (
    StringRef name,
    T const & attribute ) [inline]
```

The attribute value must provide op<<(ostream&, T). The resulting serialization is XML-encoded

The documentation for this class was generated from the following file:

- include/catch2/catch_amalgamated.hpp

Chapter 6

File Documentation

6.1 include/catch2/catch_amalgamated.hpp File Reference

```
#include <cstdint>
#include <string>
#include <iosfwd>
#include <cassert>
#include <chrono>
#include <vector>
#include <type_traits>
#include <cstdint>
#include <map>
#include <ratio>
#include <algorithm>
#include <iterator>
#include <numeric>
#include <tuple>
#include <cmath>
#include <functional>
#include <string.h>
#include <ostream>
#include <ctime>
#include <memory>
#include <sstream>
#include <exception>
#include <random>
#include <initializer_list>
#include <utility>
#include <limits>
#include <set>
#include <cstdio>
#include <array>
#include <cstring>
```

Include dependency graph for catch_amalgamated.hpp:



Classes

- class [Catch::Detail::NonCopyable](#)
Deriving classes become noncopyable and nonmovable.
- class [Catch::StringRef](#)
- struct [Catch::WarnAbout](#)
- struct [Catch::WaitForKeypress](#)
- class [Catch::IConfig](#)
- class [Catch::IContext](#)
- class [Catch::IMutableContext](#)
- struct [Catch::SourceLineInfo](#)
- struct [Catch::Counts](#)
- struct [Catch::Totals](#)
- struct [Catch::SectionInfo](#)
- struct [Catch::SectionEndInfo](#)
- struct [Catch::ResultWas](#)
- struct [Catch::ResultDisposition](#)
- struct [Catch::AssertionInfo](#)
- class [Catch::LazyExpression](#)
- struct [Catch::AssertionResultData](#)
- class [Catch::AssertionResult](#)
- class [Catch::IResultCapture](#)
- struct [Catch::MessageInfo](#)
- class [Catch::Detail::unique_ptr< T >](#)
- struct [Catch::Benchmark::Estimate< Duration >](#)
- struct [Catch::Benchmark::OutlierClassification](#)
- struct [Catch::ReporterConfig](#)
- struct [Catch::TestRunInfo](#)
- struct [Catch::AssertionStats](#)
- struct [Catch::SectionStats](#)
- struct [Catch::TestCaseStats](#)
- struct [Catch::TestRunStats](#)
- struct [Catch::BenchmarkInfo](#)
- struct [Catch::BenchmarkStats< Duration >](#)
- struct [Catch::ReporterPreferences](#)
- class [Catch::IEventListener](#)
- struct [Catch::Benchmark::now< Clock >](#)
- struct [Catch::TestFailureException](#)
Used to signal that an assertion macro failed.
- struct [Catch::always_false< T >](#)
- struct [Catch::true_given< typename >](#)
- struct [Catch::is_callable_tester](#)
- struct [Catch::is_callable< Fun\(Args...\)>](#)
- class [Catch::IRegistryHub](#)
- class [Catch::IMutableRegistryHub](#)
- struct [Catch::Benchmark::Detail::CompleteType< T >](#)
- struct [Catch::Benchmark::Detail::CompleteType< void >](#)
- struct [Catch::Benchmark::Detail::CompleteType< void >::type](#)
- struct [Catch::Benchmark::Detail::CompleteInvoker< Result >](#)
- struct [Catch::Benchmark::Detail::CompleteInvoker< void >](#)
- struct [Catch::Benchmark::Detail::ChronometerConcept](#)
- struct [Catch::Benchmark::Detail::ChronometerModel< Clock >](#)
- struct [Catch::Benchmark::Chronometer](#)
- struct [Catch::Benchmark::EnvironmentEstimate< Duration >](#)

- struct [Catch::Benchmark::Environment< Clock >](#)
- struct [Catch::Benchmark::Detail::is_related< T, U >](#)
- struct [Catch::Benchmark::Detail::BenchmarkFunction](#)
- struct [Catch::Benchmark::Detail::repeater< Fun >](#)
- struct [Catch::Benchmark::Timing< Duration, Result >](#)
- struct [Catch::Benchmark::ExecutionPlan< Duration >](#)
- struct [Catch::Benchmark::Detail::bootstrap_analysis](#)
- struct [Catch::Benchmark::SampleAnalysis< Duration >](#)
- struct [Catch::Benchmark::Benchmark](#)
- struct [Catch::Benchmark::Detail::ObjectStorage< T, Destruct >](#)
- class [Catch::ReusableStringStream](#)
- struct [Catch::Detail::make_void<... >](#)
- struct [Catch::Detail::EnumInfo](#)
- class [Catch::MutableEnumValuesRegistry](#)
- struct [Catch_global_namespace_dummy](#)
- class [Catch::Detail::IsStreamInsertable< T >](#)
- struct [Catch::StringMaker< T, typename >](#)
- struct [Catch::StringMaker< std::string >](#)
- struct [Catch::StringMaker< char const * >](#)
- struct [Catch::StringMaker< char * >](#)
- struct [Catch::StringMaker< std::wstring >](#)
- struct [Catch::StringMaker< wchar_t const * >](#)
- struct [Catch::StringMaker< wchar_t * >](#)
- struct [Catch::StringMaker< char\[SZ\]>](#)
- struct [Catch::StringMaker< signed char\[SZ\]>](#)
- struct [Catch::StringMaker< unsigned char\[SZ\]>](#)
- struct [Catch::StringMaker< int >](#)
- struct [Catch::StringMaker< long >](#)
- struct [Catch::StringMaker< long long >](#)
- struct [Catch::StringMaker< unsigned int >](#)
- struct [Catch::StringMaker< unsigned long >](#)
- struct [Catch::StringMaker< unsigned long long >](#)
- struct [Catch::StringMaker< bool >](#)
- struct [Catch::StringMaker< char >](#)
- struct [Catch::StringMaker< signed char >](#)
- struct [Catch::StringMaker< unsigned char >](#)
- struct [Catch::StringMaker< std::nullptr_t >](#)
- struct [Catch::StringMaker< float >](#)
- struct [Catch::StringMaker< double >](#)
- struct [Catch::StringMaker< T * >](#)
- struct [Catch::StringMaker< R C::* >](#)
- struct [Catch::Detail::is_range_impl< T, typename >](#)
- struct [Catch::Detail::is_range_impl< T, void_t< decltype\(begin\(std::declval< T >\(\)\)\)> >](#)
- struct [Catch::is_range< T >](#)
- struct [Catch::StringMaker< R, std::enable_if_t< is_range< R >::value &&!::Catch::Detail::IsStreamInsertable< R >::value >](#)
- struct [Catch::StringMaker< T\[SZ\]>](#)
- struct [Catch::ratio_string< Ratio >](#)
- struct [Catch::ratio_string< std::atto >](#)
- struct [Catch::ratio_string< std::femto >](#)
- struct [Catch::ratio_string< std::pico >](#)
- struct [Catch::ratio_string< std::nano >](#)
- struct [Catch::ratio_string< std::micro >](#)
- struct [Catch::ratio_string< std::milli >](#)
- struct [Catch::StringMaker< std::chrono::duration< Value, Ratio > >](#)
- struct [Catch::StringMaker< std::chrono::duration< Value, std::ratio< 1 > > >](#)

- struct [Catch::StringMaker< std::chrono::duration< Value, std::ratio< 60 > > >](#)
- struct [Catch::StringMaker< std::chrono::duration< Value, std::ratio< 3600 > > >](#)
- struct [Catch::StringMaker< std::chrono::time_point< Clock, Duration > >](#)
- struct [Catch::StringMaker< std::chrono::time_point< std::chrono::system_clock, Duration > >](#)
- class [Catch::Approx](#)
- struct [Catch::StringMaker< Catch::Approx >](#)
- class [Catch::WildcardPattern](#)
- class [Catch::TestSpec](#)
- struct [Catch::TestSpec::FilterMatch](#)
- class [Catch::Optional< T >](#)
- struct [Catch::Colour](#)
- class [Catch::ColourImpl](#)
- class [Catch::ColourImpl::ColourGuard](#)
- class [Catch::ReporterSpec](#)
- struct [Catch::ProcessedReporterSpec](#)
- struct [Catch::ConfigData](#)
- class [Catch::Config](#)
- struct [Catch::StreamEndStop](#)
- struct [Catch::MessageStream](#)
- struct [Catch::MessageBuilder](#)
- class [Catch::ScopedMessage](#)
- class [Catch::Capturer](#)
- struct [Catch::Clara::accept_many_t](#)
- struct [Catch::Clara::Detail::fake_arg](#)
- struct [Catch::Clara::Detail::is_unary_function< F, typename >](#)
- struct [Catch::Clara::Detail::is_unary_function< F, Catch::Detail::void_t< decltype\(std::declval< F >\(\)\(fake_arg\(\)\)\) > >](#)
- struct [Catch::Clara::Detail::UnaryLambdaTraits< L >](#)
- struct [Catch::Clara::Detail::UnaryLambdaTraits< ReturnT\(ClassT::*\)\(Args...\) const >](#)
- struct [Catch::Clara::Detail::UnaryLambdaTraits< ReturnT\(ClassT::*\)\(ArgT\) const >](#)
- struct [Catch::Clara::Detail::Token](#)
- class [Catch::Clara::Detail::TokenStream](#)
- class [Catch::Clara::Detail::ResultBase](#)
- class [Catch::Clara::Detail::ResultValueBase< T >](#)
- class [Catch::Clara::Detail::ResultValueBase< void >](#)
- class [Catch::Clara::Detail::BasicResult< T >](#)
- class [Catch::Clara::Detail::ParseState](#)
- struct [Catch::Clara::Detail::HelpColumns](#)
- struct [Catch::Clara::Detail::BoundRef](#)
- struct [Catch::Clara::Detail::BoundValueRefBase](#)
- struct [Catch::Clara::Detail::BoundFlagRefBase](#)
- struct [Catch::Clara::Detail::BoundValueRef< T >](#)
- struct [Catch::Clara::Detail::BoundValueRef< std::vector< T > >](#)
- struct [Catch::Clara::Detail::BoundFlagRef](#)
- struct [Catch::Clara::Detail::LambdaInvoker< ReturnType >](#)
- struct [Catch::Clara::Detail::LambdaInvoker< void >](#)
- struct [Catch::Clara::Detail::BoundLambda< L >](#)
- struct [Catch::Clara::Detail::BoundManyLambda< L >](#)
- struct [Catch::Clara::Detail::BoundFlagLambda< L >](#)
- class [Catch::Clara::Detail::ParserBase](#)
- class [Catch::Clara::Detail::ComposableParserImpl< DerivedT >](#)
- class [Catch::Clara::Detail::ParserRefImpl< DerivedT >](#)
- class [Catch::Clara::Arg](#)
- class [Catch::Clara::Opt](#)
- class [Catch::Clara::ExeName](#)
- class [Catch::Clara::Parser](#)

- class [Catch::Clara::Args](#)
- struct [Catch::Clara::Help](#)
- class [Catch::Session](#)
- struct [Catch::TagAlias](#)
- struct [Catch::RegistrarForTagAliases](#)
- class [Catch::ITransientExpression](#)
- class [Catch::BinaryExpr< LhsT, RhsT >](#)
- class [Catch::UnaryExpr< LhsT >](#)
- class [Catch::ExprLhs< LhsT >](#)
- struct [Catch::Decomposer](#)
- struct [Catch::AssertionReaction](#)
- class [Catch::AssertionHandler](#)
- class [Catch::Timer](#)
- class [Catch::Section](#)
- class [Catch::ITestInvoker](#)
- class [Catch::ITestCaseRegistry](#)
- class [Catch::TestInvokerAsMethod< C >](#)
- struct [Catch::NameAndTags](#)
- struct [Catch::AutoReg](#)
- struct [Catch::Tag](#)
- struct [Catch::TestCaseInfo](#)
- class [Catch::TestCaseHandle](#)
- class [Catch::IExceptionTranslator](#)
- class [Catch::IExceptionTranslatorRegistry](#)
- class [Catch::ExceptionTranslatorRegistrar](#)
- struct [Catch::Version](#)
- class [Catch::GeneratorException](#)
- class [Catch::Generators::GeneratorUntypedBase](#)
- class [Catch::IGeneratorTracker](#)
- class [Catch::Generators::IGenerator< T >](#)
- class [Catch::Generators::GeneratorWrapper< T >](#)
- class [Catch::Generators::SingleValueGenerator< T >](#)
- class [Catch::Generators::FixedValuesGenerator< T >](#)
- class [Catch::Generators::Generators< T >](#)
- struct [Catch::Generators::as< T >](#)
- class [Catch::Generators::TakeGenerator< T >](#)
- class [Catch::Generators::FilterGenerator< T, Predicate >](#)
- class [Catch::Generators::RepeatGenerator< T >](#)
- class [Catch::Generators::MapGenerator< T, U, Func >](#)
- class [Catch::Generators::ChunkGenerator< T >](#)
- class [Catch::SimplePcg32](#)
- class [Catch::Generators::RandomFloatingGenerator< Float >](#)
- class [Catch::Generators::RandomIntegerGenerator< Integer >](#)
- class [Catch::Generators::RangeGenerator< T >](#)
- class [Catch::Generators::IteratorGenerator< T >](#)
- class [Catch::IReporterFactory](#)
- class [Catch::EventListenerFactory](#)
- struct [Catch::Detail::CaseInsensitiveLess](#)
Provides case-insensitive op< semantics when called.
- struct [Catch::Detail::CaseInsensitiveEqualTo](#)
Provides case-insensitive op== semantics when called.
- class [Catch::IReporterRegistry](#)
- class [Catch::ITagAliasRegistry](#)
- class [Catch::Detail::EnumValuesRegistry](#)

- class [Catch::ErrnoGuard](#)
- class [Catch::ExceptionTranslatorRegistry](#)
- class [Catch::FatalConditionHandler](#)
- class [Catch::FatalConditionHandlerGuard](#)
 - Simple RAI guard for (dis)engaging the FatalConditionHandler.*
- class [Catch::IStream](#)
- struct [Catch::LeakDetector](#)
- struct [Catch::ReporterDescription](#)
- struct [Catch::ListenerDescription](#)
- struct [Catch::TagInfo](#)
- class [Catch::RedirectedStream](#)
- class [Catch::RedirectedStdOut](#)
- class [Catch::RedirectedStdErr](#)
- class [Catch::RedirectedStreams](#)
- class [Catch::ReporterRegistry](#)
- struct [Catch::TestCaseTracking::NameAndLocation](#)
- class [Catch::TestCaseTracking::ITracker](#)
- class [Catch::TestCaseTracking::TrackerContext](#)
- class [Catch::TestCaseTracking::TrackerBase](#)
- class [Catch::TestCaseTracking::SectionTracker](#)
- class [Catch::RunContext](#)
- struct [Catch::ISingleton](#)
- class [Catch::Singleton< SingletonImplT, InterfaceT, MutableInterfaceT >](#)
- class [Catch::StartupExceptionRegistry](#)
- class [Catch::pluralise](#)
- class [Catch::TagAliasRegistry](#)
- class [Catch::TestCaseInfoHasher](#)
- class [Catch::TestRegistry](#)
- class [Catch::TestInvokerAsFunction](#)
- class [Catch::TestSpecParser](#)
- class [Catch::TextFlow::Column](#)
- class [Catch::TextFlow::Column::const_iterator](#)
- class [Catch::TextFlow::Columns](#)
- class [Catch::TextFlow::Columns::iterator](#)
- class [Catch::XmlEncode](#)
- class [Catch::XmlWriter](#)
- class [Catch::XmlWriter::ScopedElement](#)
- class [Catch::MatchExpr< ArgT, MatcherT >](#)
- class [Catch::Matchers::MatcherUntypedBase](#)
- class [Catch::Matchers::MatcherBase< T >](#)
- class [Catch::Matchers::Detail::MatchAllOf< ArgT >](#)
- class [Catch::Matchers::Detail::MatchAnyOf< ArgT >](#)
- class [Catch::Matchers::Detail::MatchNotOf< ArgT >](#)
- class [Catch::Matchers::MatcherGenericBase](#)
- struct [Catch::Matchers::Detail::conjunction< Cond >](#)
- struct [Catch::Matchers::Detail::conjunction< Cond, Rest... >](#)
- class [Catch::Matchers::Detail::MatchAllOfGeneric< MatcherTs >](#)
- class [Catch::Matchers::Detail::MatchAnyOfGeneric< MatcherTs >](#)
- class [Catch::Matchers::Detail::MatchNotOfGeneric< MatcherT >](#)
- class [Catch::Matchers::IsEmptyMatcher](#)
- class [Catch::Matchers::HasSizeMatcher](#)
- class [Catch::Matchers::SizeMatchesMatcher< Matcher >](#)
- class [Catch::Matchers::ContainsElementMatcher< T, Equality >](#)

Matcher for checking that an element in range is equal to specific element.

- class [Catch::Matchers::ContainsMatcher](#)[Matcher< Matcher >](#)
Meta-matcher for checking that an element in a range matches a specific matcher.
- class [Catch::Matchers::ExceptionMessageMatcher](#)
- class [Catch::Matchers::WithinAbsMatcher](#)
- class [Catch::Matchers::WithinUlpMatcher](#)
- class [Catch::Matchers::WithinRelMatcher](#)
- class [Catch::Matchers::PredicateMatcher](#)[< T, Predicate >](#)
- class [Catch::Matchers::AllMatchMatcher](#)[< Matcher >](#)
- class [Catch::Matchers::NoneMatchMatcher](#)[< Matcher >](#)
- class [Catch::Matchers::AnyMatchMatcher](#)[< Matcher >](#)
- struct [Catch::Matchers::CasedString](#)
- class [Catch::Matchers::StringMatcherBase](#)
- class [Catch::Matchers::StringEqualsMatcher](#)
- class [Catch::Matchers::StringContainsMatcher](#)
- class [Catch::Matchers::StartsWithMatcher](#)
- class [Catch::Matchers::EndsWithMatcher](#)
- class [Catch::Matchers::RegexMatcher](#)
- class [Catch::Matchers::VectorContainsElementMatcher](#)[< T, Alloc >](#)
- class [Catch::Matchers::ContainsMatcher](#)[< T, AllocComp, AllocMatch >](#)
- class [Catch::Matchers::EqualsMatcher](#)[< T, AllocComp, AllocMatch >](#)
- class [Catch::Matchers::ApproxMatcher](#)[< T, AllocComp, AllocMatch >](#)
- class [Catch::Matchers::UnorderedEqualsMatcher](#)[< T, AllocComp, AllocMatch >](#)
- class [Catch::ReporterBase](#)
- class [Catch::StreamingReporterBase](#)
- class [Catch::AutomakeReporter](#)
- class [Catch::CompactReporter](#)
- class [Catch::ConsoleReporter](#)
- class [Catch::Detail::AssertionOrBenchmarkResult](#)
Represents either an assertion or a benchmark result to be handled by cumulative reporter later.
- class [Catch::CumulativeReporterBase](#)
- struct [Catch::CumulativeReporterBase::Node](#)[< T, ChildNodeT >](#)
- struct [Catch::CumulativeReporterBase::SectionNode](#)
- class [Catch::EventListenerBase](#)
- struct [Catch::lineOfChars](#)
- class [Catch::JUnitReporter](#)
- class [Catch::MultiReporter](#)
- struct [Catch::Detail::has_description](#)[< T, typename >](#)
- struct [Catch::Detail::has_description](#)[< T, void_t< decltype\(T::getDescription\(\)\)> >](#)
- class [Catch::ReporterFactory](#)[< T >](#)
- class [Catch::ReporterRegistrar](#)[< T >](#)
- class [Catch::ListenerRegistrar](#)[< T >](#)
- class [Catch::SonarQubeReporter](#)
- class [Catch::TAPReporter](#)
- class [Catch::TeamCityReporter](#)
- class [Catch::XmlReporter](#)

Macros

- `#define CATCH_ALL_HPP_INCLUDED`
- `#define CATCH_BENCHMARK_ALL_HPP_INCLUDED`
- `#define CATCH_BENCHMARK_HPP_INCLUDED`
- `#define CATCH_INTERFACES_CONFIG_HPP_INCLUDED`
- `#define CATCH_NONCOPYABLE_HPP_INCLUDED`
- `#define CATCH_STRINGREF_HPP_INCLUDED`
- `#define CATCH_COMPILER_CAPABILITIES_HPP_INCLUDED`
- `#define CATCH_PLATFORM_HPP_INCLUDED`
- `#define CATCH_INTERNAL_CONFIG_POSIX_SIGNALS`
- `#define CATCH_INTERNAL_CONFIG_GLOBAL_NEXTAFTER`
- `#define CATCH_CONFIG_POSIX_SIGNALS`
- `#define CATCH_CONFIG_CPP11_TO_STRING`
- `#define CATCH_CONFIG_DISABLE_EXCEPTIONS`
- `#define CATCH_CONFIG_GLOBAL_NEXTAFTER`
- `#define CATCH_INTERNAL_START_WARNINGS_SUPPRESSION`
- `#define CATCH_INTERNAL_STOP_WARNINGS_SUPPRESSION`
- `#define CATCH_INTERNAL_SUPPRESS_PARENTHESES_WARNINGS`
- `#define CATCH_INTERNAL_SUPPRESS_GLOBALS_WARNINGS`
- `#define CATCH_INTERNAL_SUPPRESS_UNUSED_VARIABLE_WARNINGS`
- `#define CATCH_INTERNAL_SUPPRESS_ZERO_VARIADIC_WARNINGS`
- `#define CATCH_INTERNAL_IGNORE_BUT_WARN(...)`
- `#define CATCH_INTERNAL_SUPPRESS_UNUSED_TEMPLATE_WARNINGS`
- `#define CATCH_TRY if ((true))`
- `#define CATCH_CATCH_ALL if ((false))`
- `#define CATCH_CATCH_ANON(type) if ((false))`
- `#define CATCH_CONTEXT_HPP_INCLUDED`
- `#define CATCH_INTERFACES_REPORTER_HPP_INCLUDED`
- `#define CATCH_SECTION_INFO_HPP_INCLUDED`
- `#define CATCH_MOVE_AND_FORWARD_HPP_INCLUDED`
- `#define CATCH_MOVE(...) static_cast<std::remove_reference_t<decltype(__VA_ARGS__)>&&>(__VA_ARGS__)`
Replacement for std::move with better compile time performance.
- `#define CATCH_FORWARD(...) static_cast<decltype(__VA_ARGS__)&&>(__VA_ARGS__)`
Replacement for std::forward with better compile time performance.
- `#define CATCH_SOURCE_LINE_INFO_HPP_INCLUDED`
- `#define CATCH_INTERNAL_LINEINFO ::Catch::SourceLineInfo(__FILE__, static_cast<std::size_t> (__`
`LINE__))`
- `#define CATCH_TOTALS_HPP_INCLUDED`
- `#define CATCH_ASSERTION_RESULT_HPP_INCLUDED`
- `#define CATCH_ASSERTION_INFO_HPP_INCLUDED`
- `#define CATCH_RESULT_TYPE_HPP_INCLUDED`
- `#define CATCH_LAZY_EXPR_HPP_INCLUDED`
- `#define CATCH_MESSAGE_INFO_HPP_INCLUDED`
- `#define CATCH_INTERFACES_CAPTURE_HPP_INCLUDED`
- `#define CATCH_UNIQUE_PTR_HPP_INCLUDED`
- `#define CATCH_ESTIMATE_HPP_INCLUDED`
- `#define CATCH_OUTLIER_CLASSIFICATION_HPP_INCLUDED`
- `#define CATCH_UNIQUE_NAME_HPP_INCLUDED`
- `#define CATCH_CONFIG_COUNTER_HPP_INCLUDED`
- `#define CATCH_INTERNAL_CONFIG_COUNTER`
- `#define CATCH_CONFIG_COUNTER`
- `#define INTERNAL_CATCH_UNIQUE_NAME_LINE2(name, line) name##line`

- `#define INTERNAL_CATCH_UNIQUE_NAME_LINE(name, line) INTERNAL_CATCH_UNIQUE_NAME_↵
LINE2(name, line)`
- `#define INTERNAL_CATCH_UNIQUE_NAME(name) INTERNAL_CATCH_UNIQUE_NAME_LINE(name,
__COUNTER__)`
- `#define CATCH_CHRONOMETER_HPP_INCLUDED`
- `#define CATCH_CLOCK_HPP_INCLUDED`
- `#define CATCH_OPTIMIZER_HPP_INCLUDED`
- `#define CATCH_COMPLETE_INVOKE_HPP_INCLUDED`
- `#define CATCH_TEST_FAILURE_EXCEPTION_HPP_INCLUDED`
- `#define CATCH_META_HPP_INCLUDED`
- `#define CATCH_INTERFACES_REGISTRY_HUB_HPP_INCLUDED`
- `#define CATCH_ENVIRONMENT_HPP_INCLUDED`
- `#define CATCH_EXECUTION_PLAN_HPP_INCLUDED`
- `#define CATCH_BENCHMARK_FUNCTION_HPP_INCLUDED`
- `#define CATCH_REPEAT_HPP_INCLUDED`
- `#define CATCH_RUN_FOR_AT_LEAST_HPP_INCLUDED`
- `#define CATCH_MEASURE_HPP_INCLUDED`
- `#define CATCH_TIMING_HPP_INCLUDED`
- `#define CATCH_ESTIMATE_CLOCK_HPP_INCLUDED`
- `#define CATCH_STATS_HPP_INCLUDED`
- `#define CATCH_ANALYSE_HPP_INCLUDED`
- `#define CATCH_SAMPLE_ANALYSIS_HPP_INCLUDED`
- `#define INTERNAL_CATCH_GET_1_ARG(arg1, arg2, ...) arg1`
- `#define INTERNAL_CATCH_GET_2_ARG(arg1, arg2, ...) arg2`
- `#define INTERNAL_CATCH_BENCHMARK(BenchmarkName, name, benchmarkIndex)`
- `#define INTERNAL_CATCH_BENCHMARK_ADVANCED(BenchmarkName, name)`
- `#define BENCHMARK(...) INTERNAL_CATCH_BENCHMARK(INTERNAL_CATCH_UNIQUE_↵
_NAME(CATCH2_INTERNAL_BENCHMARK_), INTERNAL_CATCH_GET_1_ARG(__VA_ARGS__,),
INTERNAL_CATCH_GET_2_ARG(__VA_ARGS__,))`
- `#define BENCHMARK_ADVANCED(name) INTERNAL_CATCH_BENCHMARK_ADVANCED(INTERNAL_↵
_CATCH_UNIQUE_NAME(CATCH2_INTERNAL_BENCHMARK_), name)`
- `#define CATCH_CONSTRUCTOR_HPP_INCLUDED`
- `#define CATCH_APPROX_HPP_INCLUDED`
- `#define CATCH_TOSTRING_HPP_INCLUDED`
- `#define CATCH_CONFIG_WCHAR_HPP_INCLUDED`
- `#define CATCH_CONFIG_WCHAR`
- `#define CATCH_REUSABLE_STRING_STREAM_HPP_INCLUDED`
- `#define CATCH_VOID_TYPE_HPP_INCLUDED`
- `#define CATCH_INTERFACES_ENUM_VALUES_REGISTRY_HPP_INCLUDED`
- `#define INTERNAL_CATCH_REGISTER_ENUM(enumName, ...)`
- `#define CATCH_REGISTER_ENUM(enumName, ...) INTERNAL_CATCH_REGISTER_ENUM(enumName,
__VA_ARGS__)`
- `#define CATCH_CONFIG_HPP_INCLUDED`
- `#define CATCH_TEST_SPEC_HPP_INCLUDED`
- `#define CATCH_WILDCARD_PATTERN_HPP_INCLUDED`
- `#define CATCH_CASE_SENSITIVE_HPP_INCLUDED`
- `#define CATCH_OPTIONAL_HPP_INCLUDED`
- `#define CATCH_RANDOM_SEED_GENERATION_HPP_INCLUDED`
- `#define CATCH_REPORTER_SPEC_PARSER_HPP_INCLUDED`
- `#define CATCH_CONSOLE_COLOUR_HPP_INCLUDED`
- `#define CATCH_MESSAGE_HPP_INCLUDED`
- `#define CATCH_STREAM_END_STOP_HPP_INCLUDED`
- `#define INTERNAL_CATCH_MSG(macroName, messageType, resultDisposition, ...)`
- `#define INTERNAL_CATCH_CAPTURE(varName, macroName, ...)`

- `#define INTERNAL_CATCH_INFO(macroName, log) Catch::ScopedMessage INTERNAL_CATCH_UNIQUE_NAME(scopedMessage)(Catch::MessageBuilder(macroName##_catch_sr, CATCH_INTERNAL_LINEINFO, Catch::ResultWas::Info) << log)`
- `#define INTERNAL_CATCH_UNSCOPED_INFO(macroName, log) Catch::getResultCapture().emplace<UnscopedMessage>(Catch::MessageBuilder(macroName##_catch_sr, CATCH_INTERNAL_LINEINFO, Catch::ResultWas::Info) << log)`
- `#define INFO(msg) INTERNAL_CATCH_INFO("INFO", msg)`
- `#define UNSCOPED_INFO(msg) INTERNAL_CATCH_UNSCOPED_INFO("UNSCOPED_INFO", msg)`
- `#define WARN(msg) INTERNAL_CATCH_MSG("WARN", Catch::ResultWas::Warning, Catch::ResultDisposition::ContinueOnFailure, msg)`
- `#define CAPTURE(...) INTERNAL_CATCH_CAPTURE(INTERNAL_CATCH_UNIQUE_NAME(capturer), "CAPTURE", __VA_ARGS__)`
- `#define CATCH_SESSION_HPP_INCLUDED`
- `#define CATCH_COMMANDLINE_HPP_INCLUDED`
- `#define CATCH_CLARA_HPP_INCLUDED`
- `#define CATCH_TAG_ALIAS_HPP_INCLUDED`
- `#define CATCH_TAG_ALIAS_AUTOREGISTRAR_HPP_INCLUDED`
- `#define CATCH_REGISTER_TAG_ALIAS(alias, spec)`
- `#define CATCH_TEMPLATE_TEST_MACROS_HPP_INCLUDED`
- `#define CATCH_TEST_MACROS_HPP_INCLUDED`
- `#define CATCH_TEST_MACRO_IMPL_HPP_INCLUDED`
- `#define CATCH_ASSERTION_HANDLER_HPP_INCLUDED`
- `#define CATCH_DECOMPOSER_HPP_INCLUDED`
- `#define CATCH_INTERNAL_DEFINE_EXPRESSION_OPERATOR(op)`
- `#define CATCH_INTERNAL_STRINGIFY(...) #__VA_ARGS__`
- `#define INTERNAL_CATCH_TRY`
- `#define INTERNAL_CATCH_CATCH(capturer)`
- `#define INTERNAL_CATCH_REACT(handler) handler.complete();`
- `#define INTERNAL_CATCH_TEST(macroName, resultDisposition, ...)`
- `#define INTERNAL_CATCH_IF(macroName, resultDisposition, ...)`
- `#define INTERNAL_CATCH_ELSE(macroName, resultDisposition, ...)`
- `#define INTERNAL_CATCH_NO_THROW(macroName, resultDisposition, ...)`
- `#define INTERNAL_CATCH_THROWS(macroName, resultDisposition, ...)`
- `#define INTERNAL_CATCH_THROWS_AS(macroName, exceptionType, resultDisposition, expr)`
- `#define INTERNAL_CATCH_THROWS_STR_MATCHES(macroName, resultDisposition, matcher, ...)`
- `#define CATCH_SECTION_HPP_INCLUDED`
- `#define CATCH_TIMER_HPP_INCLUDED`
- `#define INTERNAL_CATCH_SECTION(...)`
- `#define INTERNAL_CATCH_DYNAMIC_SECTION(...)`
- `#define CATCH_TEST_REGISTRY_HPP_INCLUDED`
- `#define CATCH_INTERFACES_TESTCASE_HPP_INCLUDED`
- `#define CATCH_PREPROCESSOR_REMOVE_PARENS_HPP_INCLUDED`
- `#define INTERNAL_CATCH_EXPAND1(param) INTERNAL_CATCH_EXPAND2(param)`
- `#define INTERNAL_CATCH_EXPAND2(...) INTERNAL_CATCH_NO##_VA_ARGS__`
- `#define INTERNAL_CATCH_DEF(...) INTERNAL_CATCH_DEF __VA_ARGS__`
- `#define INTERNAL_CATCH_NOINTERNAL_CATCH_DEF`
- `#define INTERNAL_CATCH_REMOVE_PARENS(...) INTERNAL_CATCH_EXPAND1(INTERNAL_CATCH_DEF __VA_ARGS__)`
- `#define INTERNAL_CATCH_TESTCASE2(testName, ...)`
- `#define INTERNAL_CATCH_TESTCASE(...) INTERNAL_CATCH_TESTCASE2(INTERNAL_CATCH_UNIQUE_NAME(CATCH2_INTERNAL_TEST_), __VA_ARGS__)`
- `#define INTERNAL_CATCH_METHOD_AS_TEST_CASE(QualifiedMethod, ...)`
- `#define INTERNAL_CATCH_TEST_CASE_METHOD2(testName, className, ...)`
- `#define INTERNAL_CATCH_TEST_CASE_METHOD(className, ...) INTERNAL_CATCH_TEST_CASE_METHOD2(INTERNAL_CATCH_UNIQUE_NAME(CATCH2_INTERNAL_TEST_), className, __VA_ARGS__)`

- `#define INTERNAL_CATCH_REGISTER_TESTCASE(Function, ...)`
- `#define REQUIRE(...) INTERNAL_CATCH_TEST("REQUIRE", Catch::ResultDisposition::Normal, __VA_ARGS__)`
- `#define REQUIRE_FALSE(...) INTERNAL_CATCH_TEST("REQUIRE_FALSE", Catch::ResultDisposition::Normal | Catch::ResultDisposition::FalseTest, __VA_ARGS__)`
- `#define REQUIRE_THROWS(...) INTERNAL_CATCH_THROWS("REQUIRE_THROWS", Catch::ResultDisposition::Normal, __VA_ARGS__)`
- `#define REQUIRE_THROWS_AS(expr, exceptionType) INTERNAL_CATCH_THROWS_AS("REQUIRE_THROWS_AS", exceptionType, Catch::ResultDisposition::Normal, expr)`
- `#define REQUIRE_NOTHROW(...) INTERNAL_CATCH_NO_THROW("REQUIRE_NOTHROW", Catch::ResultDisposition::Normal, __VA_ARGS__)`
- `#define CHECK(...) INTERNAL_CATCH_TEST("CHECK", Catch::ResultDisposition::ContinueOnFailure, __VA_ARGS__)`
- `#define CHECK_FALSE(...) INTERNAL_CATCH_TEST("CHECK_FALSE", Catch::ResultDisposition::ContinueOnFailure | Catch::ResultDisposition::FalseTest, __VA_ARGS__)`
- `#define CHECKED_IF(...) INTERNAL_CATCH_IF("CHECKED_IF", Catch::ResultDisposition::ContinueOnFailure | Catch::ResultDisposition::SuppressFail, __VA_ARGS__)`
- `#define CHECKED_ELSE(...) INTERNAL_CATCH_ELSE("CHECKED_ELSE", Catch::ResultDisposition::ContinueOnFailure | Catch::ResultDisposition::SuppressFail, __VA_ARGS__)`
- `#define CHECK_NOFAIL(...) INTERNAL_CATCH_TEST("CHECK_NOFAIL", Catch::ResultDisposition::ContinueOnFailure | Catch::ResultDisposition::SuppressFail, __VA_ARGS__)`
- `#define CHECK_THROWS(...) INTERNAL_CATCH_THROWS("CHECK_THROWS", Catch::ResultDisposition::ContinueOnFailure, __VA_ARGS__)`
- `#define CHECK_THROWS_AS(expr, exceptionType) INTERNAL_CATCH_THROWS_AS("CHECK_THROWS_AS", exceptionType, Catch::ResultDisposition::ContinueOnFailure, expr)`
- `#define CHECK_NOTHROW(...) INTERNAL_CATCH_NO_THROW("CHECK_NOTHROW", Catch::ResultDisposition::ContinueOnFailure, __VA_ARGS__)`
- `#define TEST_CASE(...) INTERNAL_CATCH_TESTCASE(__VA_ARGS__)`
- `#define TEST_CASE_METHOD(className, ...) INTERNAL_CATCH_TEST_CASE_METHOD(className, __VA_ARGS__)`
- `#define METHOD_AS_TEST_CASE(method, ...) INTERNAL_CATCH_METHOD_AS_TEST_CASE(method, __VA_ARGS__)`
- `#define REGISTER_TEST_CASE(Function, ...) INTERNAL_CATCH_REGISTER_TESTCASE(Function, __VA_ARGS__)`
- `#define SECTION(...) INTERNAL_CATCH_SECTION(__VA_ARGS__)`
- `#define DYNAMIC_SECTION(...) INTERNAL_CATCH_DYNAMIC_SECTION(__VA_ARGS__)`
- `#define FAIL(...) INTERNAL_CATCH_MSG("FAIL", Catch::ResultWas::ExplicitFailure, Catch::ResultDisposition::Normal, __VA_ARGS__)`
- `#define FAIL_CHECK(...) INTERNAL_CATCH_MSG("FAIL_CHECK", Catch::ResultWas::ExplicitFailure, Catch::ResultDisposition::ContinueOnFailure, __VA_ARGS__)`
- `#define SUCCEED(...) INTERNAL_CATCH_MSG("SUCCEED", Catch::ResultWas::Ok, Catch::ResultDisposition::ContinueOnFailure, __VA_ARGS__)`
- `#define STATIC_REQUIRE(...) static_assert(__VA_ARGS__, #__VA_ARGS__); SUCCEED(#__VA_ARGS__)`
- `#define STATIC_REQUIRE_FALSE(...) static_assert(!(__VA_ARGS__), "!(" #__VA_ARGS__ ")"); SUCCEED("!(" #__VA_ARGS__ ")")`
- `#define STATIC_CHECK(...) static_assert(__VA_ARGS__, #__VA_ARGS__); SUCCEED(#__VA_ARGS__)`
- `#define STATIC_CHECK_FALSE(...) static_assert(!(__VA_ARGS__), "!(" #__VA_ARGS__ ")"); SUCCEED("!(" #__VA_ARGS__ ")")`
- `#define SCENARIO(...) TEST_CASE("Scenario: " __VA_ARGS__)`
- `#define SCENARIO_METHOD(className, ...) INTERNAL_CATCH_TEST_CASE_METHOD(className, "Scenario: " __VA_ARGS__)`
- `#define GIVEN(desc) INTERNAL_CATCH_DYNAMIC_SECTION(" Given: " << desc)`
- `#define AND_GIVEN(desc) INTERNAL_CATCH_DYNAMIC_SECTION(" And given: " << desc)`
- `#define WHEN(desc) INTERNAL_CATCH_DYNAMIC_SECTION(" When: " << desc)`

- **#define AND_WHEN**(desc) INTERNAL_CATCH_DYNAMIC_SECTION(" And when: " << desc)
- **#define THEN**(desc) INTERNAL_CATCH_DYNAMIC_SECTION(" Then: " << desc)
- **#define AND_THEN**(desc) INTERNAL_CATCH_DYNAMIC_SECTION(" And: " << desc)
- **#define CATCH_TEMPLATE_TEST_REGISTRY_HPP_INCLUDED**
- **#define CATCH_PREPROCESSOR_HPP_INCLUDED**
- **#define CATCH_RECURSION_LEVEL0**(...) __VA_ARGS__
- **#define CATCH_RECURSION_LEVEL1**(...) CATCH_RECURSION_LEVEL0(CATCH_RECURSION_↵
LEVEL0(CATCH_RECURSION_LEVEL0(__VA_ARGS__)))
- **#define CATCH_RECURSION_LEVEL2**(...) CATCH_RECURSION_LEVEL1(CATCH_RECURSION_↵
LEVEL1(CATCH_RECURSION_LEVEL1(__VA_ARGS__)))
- **#define CATCH_RECURSION_LEVEL3**(...) CATCH_RECURSION_LEVEL2(CATCH_RECURSION_↵
LEVEL2(CATCH_RECURSION_LEVEL2(__VA_ARGS__)))
- **#define CATCH_RECURSION_LEVEL4**(...) CATCH_RECURSION_LEVEL3(CATCH_RECURSION_↵
LEVEL3(CATCH_RECURSION_LEVEL3(__VA_ARGS__)))
- **#define CATCH_RECURSION_LEVEL5**(...) CATCH_RECURSION_LEVEL4(CATCH_RECURSION_↵
LEVEL4(CATCH_RECURSION_LEVEL4(__VA_ARGS__)))
- **#define CATCH_RECURSE**(...) CATCH_RECURSION_LEVEL5(__VA_ARGS__)
- **#define CATCH_REC_END**(...)
- **#define CATCH_REC_OUT**
- **#define CATCH_EMPTY**()
- **#define CATCH_DEFER**(id) id CATCH_EMPTY()
- **#define CATCH_REC_GET_END2**() 0, CATCH_REC_END
- **#define CATCH_REC_GET_END1**(...) CATCH_REC_GET_END2
- **#define CATCH_REC_GET_END**(...) CATCH_REC_GET_END1
- **#define CATCH_REC_NEXT0**(test, next, ...) next CATCH_REC_OUT
- **#define CATCH_REC_NEXT1**(test, next) CATCH_DEFER (CATCH_REC_NEXT0) (test, next, 0)
- **#define CATCH_REC_NEXT**(test, next) CATCH_REC_NEXT1(CATCH_REC_GET_END test, next)
- **#define CATCH_REC_LIST0**(f, x, peek, ...) , f(x) CATCH_DEFER (CATCH_REC_NEXT(peek, CATCH_↵
REC_LIST1)) (f, peek, __VA_ARGS__)
- **#define CATCH_REC_LIST1**(f, x, peek, ...) , f(x) CATCH_DEFER (CATCH_REC_NEXT(peek, CATCH_↵
REC_LIST0)) (f, peek, __VA_ARGS__)
- **#define CATCH_REC_LIST2**(f, x, peek, ...) f(x) CATCH_DEFER (CATCH_REC_NEXT(peek, CATCH_↵
REC_LIST1)) (f, peek, __VA_ARGS__)
- **#define CATCH_REC_LIST0_UD**(f, userdata, x, peek, ...) , f(userdata, x) CATCH_DEFER (CATCH_REC_↵
NEXT(peek, CATCH_REC_LIST1_UD)) (f, userdata, peek, __VA_ARGS__)
- **#define CATCH_REC_LIST1_UD**(f, userdata, x, peek, ...) , f(userdata, x) CATCH_DEFER (CATCH_REC_↵
NEXT(peek, CATCH_REC_LIST0_UD)) (f, userdata, peek, __VA_ARGS__)
- **#define CATCH_REC_LIST2_UD**(f, userdata, x, peek, ...) f(userdata, x) CATCH_DEFER (CATCH_REC_↵
NEXT(peek, CATCH_REC_LIST1_UD)) (f, userdata, peek, __VA_ARGS__)
- **#define CATCH_REC_LIST_UD**(f, userdata, ...) CATCH_RECURSE(CATCH_REC_LIST2_UD(f, userdata,
__VA_ARGS__, ()(), ()(), ()(), 0))
- **#define CATCH_REC_LIST**(f, ...) CATCH_RECURSE(CATCH_REC_LIST2(f, __VA_ARGS__, ()(), ()(),
()(), 0))
- **#define INTERNAL_CATCH_STRINGIZE**(...) INTERNAL_CATCH_STRINGIZE2(__VA_ARGS__)
- **#define INTERNAL_CATCH_STRINGIZE2**(...) # __VA_ARGS__
- **#define INTERNAL_CATCH_STRINGIZE_WITHOUT_PARENS**(param) INTERNAL_CATCH_STRINGIZE(INTERNAL_↵
CATCH_REMOVE_PARENS(param))
- **#define INTERNAL_CATCH_MAKE_NAMESPACE2**(...) ns_## __VA_ARGS__
- **#define INTERNAL_CATCH_MAKE_NAMESPACE**(name) INTERNAL_CATCH_MAKE_NAMESPACE2(name)
- **#define INTERNAL_CATCH_MAKE_TYPE_LIST2**(...) decltype(get_wrapper<INTERNAL_CATCH_↵
REMOVE_PARENS_GEN(__VA_ARGS__)>())
- **#define INTERNAL_CATCH_MAKE_TYPE_LIST**(...) INTERNAL_CATCH_MAKE_TYPE_LIST2(INTERNAL_↵
CATCH_REMOVE_PARENS(__VA_ARGS__))
- **#define INTERNAL_CATCH_MAKE_TYPE_LISTS_FROM_TYPES**(...) CATCH_REC_LIST(INTERNAL_↵
CATCH_MAKE_TYPE_LIST, __VA_ARGS__)

- `#define INTERNAL_CATCH_REMOVE_PARENS_1_ARG(_0) INTERNAL_CATCH_REMOVE_PARENS(↵
_0)`
- `#define INTERNAL_CATCH_REMOVE_PARENS_2_ARG(_0, _1) INTERNAL_CATCH_REMOVE_↵
PARENS(_0), INTERNAL_CATCH_REMOVE_PARENS_1_ARG(_1)`
- `#define INTERNAL_CATCH_REMOVE_PARENS_3_ARG(_0, _1, _2) INTERNAL_CATCH_REMOVE_↵
PARENS(_0), INTERNAL_CATCH_REMOVE_PARENS_2_ARG(_1, _2)`
- `#define INTERNAL_CATCH_REMOVE_PARENS_4_ARG(_0, _1, _2, _3) INTERNAL_CATCH_REMOVE_↵
_PARENS(_0), INTERNAL_CATCH_REMOVE_PARENS_3_ARG(_1, _2, _3)`
- `#define INTERNAL_CATCH_REMOVE_PARENS_5_ARG(_0, _1, _2, _3, _4) INTERNAL_CATCH_↵
REMOVE_PARENS(_0), INTERNAL_CATCH_REMOVE_PARENS_4_ARG(_1, _2, _3, _4)`
- `#define INTERNAL_CATCH_REMOVE_PARENS_6_ARG(_0, _1, _2, _3, _4, _5) INTERNAL_CATCH_↵
REMOVE_PARENS(_0), INTERNAL_CATCH_REMOVE_PARENS_5_ARG(_1, _2, _3, _4, _5)`
- `#define INTERNAL_CATCH_REMOVE_PARENS_7_ARG(_0, _1, _2, _3, _4, _5, _6) INTERNAL_CATCH_↵
_REMOVE_PARENS(_0), INTERNAL_CATCH_REMOVE_PARENS_6_ARG(_1, _2, _3, _4, _5, _6)`
- `#define INTERNAL_CATCH_REMOVE_PARENS_8_ARG(_0, _1, _2, _3, _4, _5, _6, _7) INTERNAL_↵
CATCH_REMOVE_PARENS(_0), INTERNAL_CATCH_REMOVE_PARENS_7_ARG(_1, _2, _3, _4, _5, _6,
_7)`
- `#define INTERNAL_CATCH_REMOVE_PARENS_9_ARG(_0, _1, _2, _3, _4, _5, _6, _7, _8) INTERNAL_↵
_CATCH_REMOVE_PARENS(_0), INTERNAL_CATCH_REMOVE_PARENS_8_ARG(_1, _2, _3, _4, _5, _6,
_7, _8)`
- `#define INTERNAL_CATCH_REMOVE_PARENS_10_ARG(_0, _1, _2, _3, _4, _5, _6, _7, _8, _↵
9) INTERNAL_CATCH_REMOVE_PARENS(_0), INTERNAL_CATCH_REMOVE_PARENS_9_ARG(_1, _↵
2, _3, _4, _5, _6, _7, _8, _9)`
- `#define INTERNAL_CATCH_REMOVE_PARENS_11_ARG(_0, _1, _2, _3, _4, _5, _6, _7, _8, _9, _↵
10) INTERNAL_CATCH_REMOVE_PARENS(_0), INTERNAL_CATCH_REMOVE_PARENS_10_ARG(_1, _↵
2, _3, _4, _5, _6, _7, _8, _9, _10)`
- `#define INTERNAL_CATCH_VA_NARGS_IMPL(_0, _1, _2, _3, _4, _5, _6, _7, _8, _9, _10, N, ...) N`
- `#define INTERNAL_CATCH_TYPE_GEN`
- `#define INTERNAL_CATCH_NTTP_1(signature, ...)`
- `#define INTERNAL_CATCH_DECLARE_SIG_TEST0(TestName)`
- `#define INTERNAL_CATCH_DECLARE_SIG_TEST1(TestName, signature)`
- `#define INTERNAL_CATCH_DECLARE_SIG_TEST_X(TestName, signature, ...)`
- `#define INTERNAL_CATCH_DEFINE_SIG_TEST0(TestName)`
- `#define INTERNAL_CATCH_DEFINE_SIG_TEST1(TestName, signature)`
- `#define INTERNAL_CATCH_DEFINE_SIG_TEST_X(TestName, signature, ...)`
- `#define INTERNAL_CATCH_NTTP_REGISTER0(TestFunc, signature)`
- `#define INTERNAL_CATCH_NTTP_REGISTER(TestFunc, signature, ...)`
- `#define INTERNAL_CATCH_NTTP_REGISTER_METHOD0(TestName, signature, ...)`
- `#define INTERNAL_CATCH_NTTP_REGISTER_METHOD(TestName, signature, ...)`
- `#define INTERNAL_CATCH_DECLARE_SIG_TEST_METHOD0(TestName, ClassName)`
- `#define INTERNAL_CATCH_DECLARE_SIG_TEST_METHOD1(TestName, ClassName, signature)`
- `#define INTERNAL_CATCH_DECLARE_SIG_TEST_METHOD_X(TestName, ClassName, signature, ...)`
- `#define INTERNAL_CATCH_DEFINE_SIG_TEST_METHOD0(TestName)`
- `#define INTERNAL_CATCH_DEFINE_SIG_TEST_METHOD1(TestName, signature)`
- `#define INTERNAL_CATCH_DEFINE_SIG_TEST_METHOD_X(TestName, signature, ...)`
- `#define INTERNAL_CATCH_NTTP_0`
- `#define INTERNAL_CATCH_NTTP_GEN(...) INTERNAL_CATCH_VA_NARGS_IMPL(__VA_ARGS_↵
__, INTERNAL_CATCH_NTTP_1(__VA_ARGS__), INTERNAL_CATCH_NTTP_1(__VA_ARGS__),
INTERNAL_CATCH_NTTP_1(__VA_ARGS__), INTERNAL_CATCH_NTTP_1(__VA_ARGS__), INTERNAL_↵
_CATCH_NTTP_1(__VA_ARGS__), INTERNAL_CATCH_NTTP_1(__VA_ARGS__), INTERNAL_CATCH_↵
_NTTP_1(__VA_ARGS__), INTERNAL_CATCH_NTTP_1(__VA_ARGS__), INTERNAL_CATCH_NTTP_1(
__VA_ARGS__),INTERNAL_CATCH_NTTP_1(__VA_ARGS__), INTERNAL_CATCH_NTTP_0)`

- **#define INTERNAL_CATCH_TEMPLATE_TEST_CASE_SIG**(Name, Tags, Signature, ...) INTERNAL_CATCH_TEMPLATE_TEST_CASE_2(INTERNAL_CATCH_UNIQUE_NAME(CATCH2_INTERNAL_TEMPLATE_TEST_), INTERNAL_CATCH_UNIQUE_NAME(CATCH2_INTERNAL_TEMPLATE_TEST_), Name, Tags, Signature, __VA_ARGS__)
- **#define INTERNAL_CATCH_TEMPLATE_PRODUCT_TEST_CASE2**(TestName, TestFuncName, Name, Tags, Signature, TmplTypes, TypesList)
- **#define INTERNAL_CATCH_TEMPLATE_PRODUCT_TEST_CASE**(Name, Tags, ...) INTERNAL_CATCH_TEMPLATE_PRODUCT_TEST_CASE2(INTERNAL_CATCH_UNIQUE_NAME(CATCH2_INTERNAL_TEMPLATE_TEST_), INTERNAL_CATCH_UNIQUE_NAME(CATCH2_INTERNAL_TEMPLATE_TEST_), Name, Tags, typename T, __VA_ARGS__)
- **#define INTERNAL_CATCH_TEMPLATE_PRODUCT_TEST_CASE_SIG**(Name, Tags, Signature, ...) INTERNAL_CATCH_TEMPLATE_PRODUCT_TEST_CASE2(INTERNAL_CATCH_UNIQUE_NAME(CATCH2_INTERNAL_TEMPLATE_TEST_), INTERNAL_CATCH_UNIQUE_NAME(CATCH2_INTERNAL_TEMPLATE_TEST_), Name, Tags, Signature, __VA_ARGS__)
- **#define INTERNAL_CATCH_TEMPLATE_LIST_TEST_CASE_2**(TestName, TestFunc, Name, Tags, TmplList)
- **#define INTERNAL_CATCH_TEMPLATE_LIST_TEST_CASE**(Name, Tags, TmplList) INTERNAL_CATCH_TEMPLATE_LIST_TEST_CASE_2(INTERNAL_CATCH_UNIQUE_NAME(CATCH2_INTERNAL_TEMPLATE_TEST_), INTERNAL_CATCH_UNIQUE_NAME(CATCH2_INTERNAL_TEMPLATE_TEST_), Name, Tags, TmplList)
- **#define INTERNAL_CATCH_TEMPLATE_TEST_CASE_METHOD_2**(TestNameClass, TestName, ClassName, Name, Tags, Signature, ...)
- **#define INTERNAL_CATCH_TEMPLATE_TEST_CASE_METHOD**(ClassName, Name, Tags, ...) INTERNAL_CATCH_TEMPLATE_TEST_CASE_METHOD_2(INTERNAL_CATCH_UNIQUE_NAME(CATCH2_INTERNAL_TEMPLATE_TEST_CLASS_), INTERNAL_CATCH_UNIQUE_NAME(CATCH2_INTERNAL_TEMPLATE_TEST_), ClassName, Name, Tags, typename T, __VA_ARGS__)
- **#define INTERNAL_CATCH_TEMPLATE_TEST_CASE_METHOD_SIG**(ClassName, Name, Tags, Signature, ...) INTERNAL_CATCH_TEMPLATE_TEST_CASE_METHOD_2(INTERNAL_CATCH_UNIQUE_NAME(CATCH2_INTERNAL_TEMPLATE_TEST_CLASS_), INTERNAL_CATCH_UNIQUE_NAME(CATCH2_INTERNAL_TEMPLATE_TEST_), ClassName, Name, Tags, Signature, __VA_ARGS__)
- **#define INTERNAL_CATCH_TEMPLATE_PRODUCT_TEST_CASE_METHOD_2**(TestNameClass, TestName, ClassName, Name, Tags, Signature, TmplTypes, TypesList)
- **#define INTERNAL_CATCH_TEMPLATE_PRODUCT_TEST_CASE_METHOD**(ClassName, Name, Tags, ...) INTERNAL_CATCH_TEMPLATE_PRODUCT_TEST_CASE_METHOD_2(INTERNAL_CATCH_UNIQUE_NAME(CATCH2_INTERNAL_TEMPLATE_TEST_), INTERNAL_CATCH_UNIQUE_NAME(CATCH2_INTERNAL_TEMPLATE_TEST_), ClassName, Name, Tags, typename T, __VA_ARGS__)
- **#define INTERNAL_CATCH_TEMPLATE_PRODUCT_TEST_CASE_METHOD_SIG**(ClassName, Name, Tags, Signature, ...) INTERNAL_CATCH_TEMPLATE_PRODUCT_TEST_CASE_METHOD_2(INTERNAL_CATCH_UNIQUE_NAME(CATCH2_INTERNAL_TEMPLATE_TEST_), INTERNAL_CATCH_UNIQUE_NAME(CATCH2_INTERNAL_TEMPLATE_TEST_), ClassName, Name, Tags, Signature, __VA_ARGS__)
- **#define INTERNAL_CATCH_TEMPLATE_LIST_TEST_CASE_METHOD_2**(TestNameClass, TestName, ClassName, Name, Tags, TmplList)
- **#define INTERNAL_CATCH_TEMPLATE_LIST_TEST_CASE_METHOD**(ClassName, Name, Tags, TmplList) INTERNAL_CATCH_TEMPLATE_LIST_TEST_CASE_METHOD_2(INTERNAL_CATCH_UNIQUE_NAME(CATCH2_INTERNAL_TEMPLATE_TEST_), INTERNAL_CATCH_UNIQUE_NAME(CATCH2_INTERNAL_TEMPLATE_TEST_), ClassName, Name, Tags, TmplList)
- **#define TEMPLATE_TEST_CASE**(...) INTERNAL_CATCH_TEMPLATE_TEST_CASE(__VA_ARGS__)
- **#define TEMPLATE_TEST_CASE_SIG**(...) INTERNAL_CATCH_TEMPLATE_TEST_CASE_SIG(__VA_ARGS__)
- **#define TEMPLATE_TEST_CASE_METHOD**(className, ...) INTERNAL_CATCH_TEMPLATE_TEST_CASE_METHOD(className, __VA_ARGS__)
- **#define TEMPLATE_TEST_CASE_METHOD_SIG**(className, ...) INTERNAL_CATCH_TEMPLATE_TEST_CASE_METHOD_SIG(className, __VA_ARGS__)
- **#define TEMPLATE_PRODUCT_TEST_CASE**(...) INTERNAL_CATCH_TEMPLATE_PRODUCT_TEST_CASE(__VA_ARGS__)

- **#define TEMPLATE_PRODUCT_TEST_CASE_SIG(...)** INTERNAL_CATCH_TEMPLATE_PRODUCT_↵
TEST_CASE_SIG(__VA_ARGS__)
- **#define TEMPLATE_PRODUCT_TEST_CASE_METHOD(className, ...)** INTERNAL_CATCH_↵
TEMPLATE_PRODUCT_TEST_CASE_METHOD(className, __VA_ARGS__)
- **#define TEMPLATE_PRODUCT_TEST_CASE_METHOD_SIG(className, ...)** INTERNAL_CATCH_↵
TEMPLATE_PRODUCT_TEST_CASE_METHOD_SIG(className, __VA_ARGS__)
- **#define TEMPLATE_LIST_TEST_CASE(...)** INTERNAL_CATCH_TEMPLATE_LIST_TEST_CASE(↵
__VA_ARGS__)
- **#define TEMPLATE_LIST_TEST_CASE_METHOD(className, ...)** INTERNAL_CATCH_TEMPLATE_↵
LIST_TEST_CASE_METHOD(className, __VA_ARGS__)
- **#define CATCH_TEST_CASE_INFO_HPP_INCLUDED**
- **#define CATCH_TRANSLATE_EXCEPTION_HPP_INCLUDED**
- **#define CATCH_INTERFACES_EXCEPTION_HPP_INCLUDED**
- **#define INTERNAL_CATCH_TRANSLATE_EXCEPTION2(translatorName, signature)**
- **#define INTERNAL_CATCH_TRANSLATE_EXCEPTION(signature)** INTERNAL_CATCH_TRANSLATE_↵
EXCEPTION2(INTERNAL_CATCH_UNIQUE_NAME(catch_internal_ExceptionTranslator), signature)
- **#define CATCH_TRANSLATE_EXCEPTION(signature)** INTERNAL_CATCH_TRANSLATE_EXCEPTION(↵
signature)
- **#define CATCH_VERSION_HPP_INCLUDED**
- **#define CATCH_VERSION_MACROS_HPP_INCLUDED**
- **#define CATCH_VERSION_MAJOR** 3
- **#define CATCH_VERSION_MINOR** 0
- **#define CATCH_VERSION_PATCH** 1
- **#define CATCH_GENERATORS_ALL_HPP_INCLUDED**
- **#define CATCH_GENERATOR_EXCEPTION_HPP_INCLUDED**
- **#define CATCH_GENERATORS_HPP_INCLUDED**
- **#define CATCH_INTERFACES_GENERATORTRACKER_HPP_INCLUDED**
- **#define GENERATE(...)**
- **#define GENERATE_COPY(...)**
- **#define GENERATE_REF(...)**
- **#define CATCH_GENERATORS_ADAPTERS_HPP_INCLUDED**
- **#define CATCH_GENERATORS_RANDOM_HPP_INCLUDED**
- **#define CATCH_RANDOM_NUMBER_GENERATOR_HPP_INCLUDED**
- **#define CATCH_GENERATORS_RANGE_HPP_INCLUDED**
- **#define CATCH_INTERFACES_ALL_HPP_INCLUDED**
- **#define CATCH_INTERFACES_REPORTER_FACTORY_HPP_INCLUDED**
- **#define CATCH_INTERFACES_REPORTER_REGISTRY_HPP_INCLUDED**
- **#define CATCH_CASE_INSENSITIVE_COMPARISONS_HPP_INCLUDED**
- **#define CATCH_INTERFACES_TAG_ALIAS_REGISTRY_HPP_INCLUDED**
- **#define CATCH_CONFIG_ANDROID_LOGWRITE_HPP_INCLUDED**
- **#define CATCH_CONFIG_UNCAUGHT_EXCEPTIONS_HPP_INCLUDED**
- **#define CATCH_CONFIG_CONSOLE_WIDTH_HPP_INCLUDED**
- **#define CATCH_CONFIG_CONSOLE_WIDTH** 80
- **#define CATCH_CONTAINER_NONMEMBERS_HPP_INCLUDED**
- **#define CATCH_CONFIG_POLYFILL_NONMEMBER_CONTAINER_ACCESS**
- **#define CATCH_DEBUG_CONSOLE_HPP_INCLUDED**
- **#define CATCH_DEBUGGER_HPP_INCLUDED**
- **#define CATCH_BREAK_INTO_DEBUGGER()** []{}()
- **#define CATCH_ENFORCE_HPP_INCLUDED**
- **#define CATCH_MAKE_MSG(...)** (Catch::ReusableStringStream() << __VA_ARGS__).str()
- **#define CATCH_INTERNAL_ERROR(...)** Catch::throw_logic_error(CATCH_MAKE_MSG(CATCH_↵
INTERNAL_LINEINFO << ": Internal Catch2 error: " << __VA_ARGS__))
- **#define CATCH_ERROR(...)** Catch::throw_domain_error(CATCH_MAKE_MSG(__VA_ARGS__))
- **#define CATCH_RUNTIME_ERROR(...)** Catch::throw_runtime_error(CATCH_MAKE_MSG(__VA_ARGS_↵
__))

- `#define CATCH_ENFORCE(condition, ...) do{ if(!(condition)) CATCH_ERROR(__VA_ARGS__); }`
`while(false)`
- `#define CATCH_ENUM_VALUES_REGISTRY_HPP_INCLUDED`
- `#define CATCH_ERRNO_GUARD_HPP_INCLUDED`
- `#define CATCH_EXCEPTION_TRANSLATOR_REGISTRY_HPP_INCLUDED`
- `#define CATCH_FATAL_CONDITION_HANDLER_HPP_INCLUDED`
- `#define CATCH_FLOATING_POINT_HELPERS_HPP_INCLUDED`
- `#define CATCH_POLYFILLS_HPP_INCLUDED`
- `#define CATCH_ISTREAM_HPP_INCLUDED`
- `#define CATCH_LEAK_DETECTOR_HPP_INCLUDED`
- `#define CATCH_LIST_HPP_INCLUDED`
- `#define CATCH_OUTPUT_REDIRECT_HPP_INCLUDED`
- `#define CATCH_REPORTER_REGISTRY_HPP_INCLUDED`
- `#define CATCH_RUN_CONTEXT_HPP_INCLUDED`
- `#define CATCH_TEST_CASE_TRACKER_HPP_INCLUDED`
- `#define CATCH_SHARDING_HPP_INCLUDED`
- `#define CATCH_SINGLETONS_HPP_INCLUDED`
- `#define CATCH_STARTUP_EXCEPTION_REGISTRY_HPP_INCLUDED`
- `#define CATCH_STDSTREAMS_HPP_INCLUDED`
- `#define CATCH_STRING_MANIP_HPP_INCLUDED`
- `#define CATCH_TAG_ALIAS_REGISTRY_HPP_INCLUDED`
- `#define CATCH_TEST_CASE_INFO_HASHER_HPP_INCLUDED`
- `#define CATCH_TEST_CASE_REGISTRY_IMPL_HPP_INCLUDED`
- `#define CATCH_TEST_SPEC_PARSER_HPP_INCLUDED`
- `#define CATCH_TEXTFLOW_HPP_INCLUDED`
- `#define CATCH_TO_STRING_HPP_INCLUDED`
- `#define CATCH_UNCAUGHT_EXCEPTIONS_HPP_INCLUDED`
- `#define CATCH_WINDOWS_H_PROXY_HPP_INCLUDED`
- `#define CATCH_XMLWRITER_HPP_INCLUDED`
- `#define CATCH_MATCHERS_ALL_HPP_INCLUDED`
- `#define CATCH_MATCHERS_HPP_INCLUDED`
- `#define CATCH_MATCHERS_IMPL_HPP_INCLUDED`
- `#define INTERNAL_CHECK_THAT(macroName, matcher, resultDisposition, arg)`
- `#define INTERNAL_CATCH_THROWS_MATCHES(macroName, exceptionType, resultDisposition, matcher,`
`...)`
- `#define REQUIRE_THROWS_WITH(expr, matcher) INTERNAL_CATCH_THROWS_STR_MATCHES(`
`"REQUIRE_THROWS_WITH", Catch::ResultDisposition::Normal, matcher, expr)`
- `#define REQUIRE_THROWS_MATCHES(expr, exceptionType, matcher) INTERNAL_CATCH_THROWS_↵`
`MATCHES("REQUIRE_THROWS_MATCHES", exceptionType, Catch::ResultDisposition::Normal, matcher,`
`expr)`
- `#define CHECK_THROWS_WITH(expr, matcher) INTERNAL_CATCH_THROWS_STR_MATCHES(`
`"CHECK_THROWS_WITH", Catch::ResultDisposition::ContinueOnFailure, matcher, expr)`
- `#define CHECK_THROWS_MATCHES(expr, exceptionType, matcher) INTERNAL_CATCH_THROWS_↵`
`MATCHES("CHECK_THROWS_MATCHES", exceptionType, Catch::ResultDisposition::ContinueOnFailure,`
`matcher, expr)`
- `#define CHECK_THAT(arg, matcher) INTERNAL_CHECK_THAT("CHECK_THAT", matcher, Catch::↵`
`ResultDisposition::ContinueOnFailure, arg)`
- `#define REQUIRE_THAT(arg, matcher) INTERNAL_CHECK_THAT("REQUIRE_THAT", matcher, Catch::↵`
`ResultDisposition::Normal, arg)`
- `#define CATCH_MATCHERS_CONTAINER_PROPERTIES_HPP_INCLUDED`
- `#define CATCH_MATCHERS_TEMPLATED_HPP_INCLUDED`
- `#define CATCH_MATCHERS_CONTAINS_HPP_INCLUDED`
- `#define CATCH_MATCHERS_EXCEPTION_HPP_INCLUDED`
- `#define CATCH_MATCHERS_FLOATING_POINT_HPP_INCLUDED`
- `#define CATCH_MATCHERS_PREDICATE_HPP_INCLUDED`

- `#define CATCH_MATCHERS_QUANTIFIERS_HPP_INCLUDED`
- `#define CATCH_MATCHERS_STRING_HPP_INCLUDED`
- `#define CATCH_MATCHERS_VECTOR_HPP_INCLUDED`
- `#define CATCH_REPORTERS_ALL_HPP_INCLUDED`
- `#define CATCH_REPORTER_AUTOMAKE_HPP_INCLUDED`
- `#define CATCH_REPORTER_STREAMING_BASE_HPP_INCLUDED`
- `#define CATCH_REPORTER_COMMON_BASE_HPP_INCLUDED`
- `#define CATCH_REPORTER_COMPACT_HPP_INCLUDED`
- `#define CATCH_REPORTER_CONSOLE_HPP_INCLUDED`
- `#define CATCH_REPORTER_CUMULATIVE_BASE_HPP_INCLUDED`
- `#define CATCH_REPORTER_EVENT_LISTENER_HPP_INCLUDED`
- `#define CATCH_REPORTER_HELPERS_HPP_INCLUDED`
- `#define CATCH_REPORTER_JUNIT_HPP_INCLUDED`
- `#define CATCH_REPORTER_MULTI_HPP_INCLUDED`
- `#define CATCH_REPORTER_REGISTRARS_HPP_INCLUDED`
- `#define CATCH_REGISTER_REPORTER(name, reporterType)`
- `#define CATCH_REGISTER_LISTENER(listenerType)`
- `#define CATCH_REPORTER_SONARQUBE_HPP_INCLUDED`
- `#define CATCH_REPORTER_TAP_HPP_INCLUDED`
- `#define CATCH_REPORTER_TEAMCITY_HPP_INCLUDED`
- `#define CATCH_REPORTER_XML_HPP_INCLUDED`

Typedefs

- using **Catch::IEventListenerPtr** = Detail::unique_ptr< IEventListener >
- template<typename Clock >
using **Catch::Benchmark::ClockDuration** = typename Clock::duration
- template<typename Clock >
using **Catch::Benchmark::FloatDuration** = std::chrono::duration< double, typename Clock::period >
- template<typename Clock >
using **Catch::Benchmark::TimePoint** = typename Clock::time_point
- using **Catch::Benchmark::default_clock** = std::chrono::steady_clock
- using **Catch::Benchmark::fp_seconds** = std::chrono::duration< double, std::ratio< 1 > >
- template<typename Func , typename... U>
using **Catch::FunctionReturnType** = std::remove_reference_t< std::remove_cv_t< std::result_of_t< Func(U...) > >>
- using **Catch::IReporterFactoryPtr** = Detail::unique_ptr< IReporterFactory >
- template<typename T >
using **Catch::Benchmark::Detail::CompleteType_t** = typename CompleteType< T >::type
- template<typename Clock , typename Func , typename... Args>
using **Catch::Benchmark::TimingOf** = Timing< ClockDuration< Clock > , Detail::CompleteType_t< FunctionReturnType< Func, Args... > >>
- template<typename Clock , typename Fun >
using **Catch::Benchmark::Detail::run_for_at_least_argument_t** = std::conditional_t< is_callable< Fun(Chronometer)>::value, Chronometer, int >
- using **Catch::Benchmark::Detail::sample** = std::vector< double >
- template<typename T >
using **Catch::Benchmark::storage_for** = Detail::ObjectStorage< T, true >
- template<typename T >
using **Catch::Benchmark::destructable_object** = Detail::ObjectStorage< T, false >
- template<typename... Ts>
using **Catch::Detail::void_t** = typename make_void< Ts... >::type
- using **Catch::Clara::Detail::Result** = BasicResult< void >
- using **Catch::Clara::Detail::ParserResult** = BasicResult< ParseResultType >

- using **Catch::Clara::Detail::InternalParseResult** = BasicResult< ParseState >
- using **Catch::exceptionTranslateFunction** = std::string(*)()
- using **Catch::ExceptionTranslators** = std::vector< Detail::unique_ptr< IExceptionTranslator const > >
- using **Catch::Generators::GeneratorBasePtr** = [Catch::Detail::unique_ptr](#)< GeneratorUntypedBase >
- template<typename T >
using **Catch::Generators::GeneratorPtr** = [Catch::Detail::unique_ptr](#)< IGenerator< T > >
- using **Catch::TestCaseTracking::ITrackerPtr** = [Catch::Detail::unique_ptr](#)< ITracker >
- using **Catch::StringMatcher** = Matchers::MatcherBase< std::string >
- template<typename T >
using **Catch::Matchers::Detail::is_generic_matcher** = std::is_base_of< [Catch::Matchers::MatcherGenericBase](#), std::remove_cv_t< std::remove_reference_t< T > > >
- template<typename... Ts>
using **Catch::Matchers::Detail::are_generic_matchers** = conjunction< is_generic_matcher< Ts >... >
- template<typename T >
using **Catch::Matchers::Detail::is_matcher** = std::is_base_of< [Catch::Matchers::MatcherUntypedBase](#), std::remove_cv_t< std::remove_reference_t< T > > >

Enumerations

- enum class **Verbosity** { **Quiet** = 0 , **Normal** , **High** }
 - enum class **ShowDurations** { **DefaultForReporter** , **Always** , **Never** }
 - enum class **TestRunOrder** { **Declared** , **LexicographicallySorted** , **Randomized** }
 - enum class [Catch::ColourMode](#) : std::uint8_t { [PlatformDefault](#) , [ANSI](#) , [Win32](#) , [None](#) }
 - enum class **CaseSensitive** { **Yes** , **No** }
 - enum class [Catch::GenerateFrom](#) { **Time** , **RandomDevice** , **Default** }
 - enum class **ParseResultType** { **Matched** , **NoMatch** , **ShortCircuitAll** , **ShortCircuitSame** }
 - enum class **TokenType** { **Option** , **Argument** }
 - enum class [Catch::Clara::Detail::ResultType](#) { [Ok](#) , [LogicError](#) , [RuntimeError](#) }
- Denotes type of a parsing result.*
- enum class **Optionality** { **Optional** , **Required** }
 - enum class **TestCaseProperties** : uint8_t {
None = 0 , **IsHidden** = 1 << 1 , **ShouldFail** = 1 << 2 , **MayFail** = 1 << 3 ,
Throws = 1 << 4 , **NonPortable** = 1 << 5 , **Benchmark** = 1 << 6 }
 - enum class **XmlFormatting** { **None** = 0x00 , **Indent** = 0x01 , **Newline** = 0x02 }

Functions

- constexpr auto **Catch::operator""_sr** (char const *rawChars, std::size_t size) noexcept -> StringRef
- constexpr auto **operator""_catch_sr** (char const *rawChars, std::size_t size) noexcept -> [Catch::StringRef](#)
- IMutableContext & **Catch::getCurrentMutableContext** ()
- IContext & **Catch::getCurrentContext** ()
- void **Catch::cleanUpContext** ()
- SimplePcg32 & **Catch::sharedRng** ()
- bool **Catch::isOk** (ResultWas::OfType resultType)
- bool **Catch::isJustInfo** (int flags)
- ResultDisposition::Flags **Catch::operator|** (ResultDisposition::Flags lhs, ResultDisposition::Flags rhs)
- bool **Catch::shouldContinueOnFailure** (int flags)
- bool **Catch::isFalseTest** (int flags)
- bool **Catch::shouldSuppressFailure** (int flags)
- IResultCapture & **Catch::getResultCapture** ()
- template<typename T, typename... Args>
unique_ptr< T > **Catch::Detail::make_unique** (Args &&... args)

- `template<typename T >`
`void Catch::Benchmark::deoptimize_value (T &&x)`
- `template<typename Fn , typename... Args>`
`auto Catch::Benchmark::invoke_deoptimized (Fn &&fn, Args &&... args) -> std::enable_if_t<!std::is_↵`
`same< void, decltype(fn(args...))>::value >`
- `IRegistryHub const & Catch::getRegistryHub ()`
- `IMutableRegistryHub & Catch::getMutableRegistryHub ()`
- `void Catch::cleanUp ()`
- `std::string Catch::translateActiveException ()`
- `template<typename Fun , typename... Args>`
`CompleteType_t< FunctionReturnType< Fun, Args... > > Catch::Benchmark::Detail::complete_invoke`
`(Fun &&fun, Args &&... args)`
- `template<typename Fun >`
`Detail::CompleteType_t< FunctionReturnType< Fun > > Catch::Benchmark::user_code (Fun &&fun)`
- `template<typename Fun >`
`repeater< std::decay_t< Fun > > Catch::Benchmark::Detail::repeat (Fun &&fun)`
- `template<typename Clock , typename Fun , typename... Args>`
`TimingOf< Clock, Fun, Args... > Catch::Benchmark::Detail::measure (Fun &&fun, Args &&... args)`
- `template<typename Clock , typename Fun >`
`TimingOf< Clock, Fun, int > Catch::Benchmark::Detail::measure_one (Fun &&fun, int iters, std::false_↵`
`type)`
- `template<typename Clock , typename Fun >`
`TimingOf< Clock, Fun, Chronometer > Catch::Benchmark::Detail::measure_one (Fun &&fun, int iters,`
`std::true_type)`
- `void Catch::Benchmark::Detail::throw_optimized_away_error ()`
- `template<typename Clock , typename Fun >`
`TimingOf< Clock, Fun, run_for_at_least_argument_t< Clock, Fun > > Catch::Benchmark::Detail::run_↵`
`for_at_least (ClockDuration< Clock > how_long, const int initial_iterations, Fun &&fun)`
- `bool Catch::Benchmark::Detail::directCompare (double lhs, double rhs)`
- `double Catch::Benchmark::Detail::weighted_average_quantile (int k, int q, std::vector< double >↵`
`::iterator first, std::vector< double >::iterator last)`
- `template<typename Iterator >`
`OutlierClassification Catch::Benchmark::Detail::classify_outliers (Iterator first, Iterator last)`
- `template<typename Iterator >`
`double Catch::Benchmark::Detail::mean (Iterator first, Iterator last)`
- `template<typename Estimator , typename Iterator >`
`sample Catch::Benchmark::Detail::jackknife (Estimator &&estimator, Iterator first, Iterator last)`
- `double Catch::Benchmark::Detail::normal_cdf (double x)`
- `double Catch::Benchmark::Detail::erfc_inv (double x)`
- `double Catch::Benchmark::Detail::normal_quantile (double p)`
- `template<typename Iterator , typename Estimator >`
`Estimate< double > Catch::Benchmark::Detail::bootstrap (double confidence_level, Iterator first, Iterator`
`last, sample const &resample, Estimator &&estimator)`
- `double Catch::Benchmark::Detail::outlier_variance (Estimate< double > mean, Estimate< double >`
`stddev, int n)`
- `bootstrap_analysis Catch::Benchmark::Detail::analyse_samples (double confidence_level, unsigned int`
`n_resamples, std::vector< double >::iterator first, std::vector< double >::iterator last)`
- `template<typename Clock >`
`std::vector< double > Catch::Benchmark::Detail::resolution (int k)`
- `template<typename Clock >`
`int Catch::Benchmark::Detail::warmup ()`
- `template<typename Clock >`
`EnvironmentEstimate< FloatDuration< Clock > > Catch::Benchmark::Detail::estimate_clock_↵`
`resolution (int iterations)`
- `template<typename Clock >`
`EnvironmentEstimate< FloatDuration< Clock > > Catch::Benchmark::Detail::estimate_clock_cost`
`(FloatDuration< Clock > resolution)`

- `template<typename Clock >`
`Environment< FloatDuration< Clock > > Catch::Benchmark::Detail::measure_environment ()`
- `template<typename Duration , typename Iterator >`
`SampleAnalysis< Duration > Catch::Benchmark::Detail::analyse (const IConfig &cfg, Environment< Duration >, Iterator first, Iterator last)`
- `std::ostream & operator<< (std::ostream &, Catch_global_namespace_dummy)`
- `std::string Catch::Detail::convertIntoString (StringRef string, bool escapeInvisibles)`
Encases `string` in quotes, and optionally escapes invisibles.
- `std::string Catch::Detail::convertIntoString (StringRef string)`
- `std::string Catch::Detail::rawMemoryToString (const void *object, std::size_t size)`
- `template<typename T >`
`std::string Catch::Detail::rawMemoryToString (const T &object)`
- `template<typename E >`
`std::string Catch::Detail::convertUnknownEnumToString (E e)`
- `template<typename T >`
`std::enable_if_t< !std::is_enum< T >::value &&!std::is_base_of< std::exception, T >::value, std::string > Catch::Detail::convertUnstreamable (T const &)`
- `template<typename T >`
`std::enable_if_t< !std::is_enum< T >::value &&std::is_base_of< std::exception, T >::value, std::string > Catch::Detail::convertUnstreamable (T const &ex)`
- `template<typename T >`
`std::enable_if_t< std::is_enum< T >::value, std::string > Catch::Detail::convertUnstreamable (T const &value)`
- `template<typename T >`
`std::string Catch::Detail::stringify (const T &e)`
- `template<typename InputIterator , typename Sentinel = InputIterator>`
`std::string Catch::Detail::rangeToString (InputIterator first, Sentinel last)`
- `template<typename Range >`
`std::string Catch::rangeToString (Range const &range)`
- `template<typename Allocator >`
`std::string Catch::rangeToString (std::vector< bool, Allocator > const &v)`
- Approx `Catch::literals::operator""_a` (long double val)
- Approx `Catch::literals::operator""_a` (unsigned long long val)
- `std::uint32_t Catch::generateRandomSeed (GenerateFrom from)`
- `Detail::unique_ptr< ColourImpl > Catch::makeColourImpl (ColourMode colourSelection, IStream *stream)`
Provides [ColourImpl](#) based on global config and target compilation platform.
- `bool Catch::isColourImplAvailable (ColourMode colourSelection)`
Checks if specific colour impl has been compiled into the binary.
- `std::vector< std::string > Catch::Detail::splitReporterSpec (StringRef reporterSpec)`
Splits the reporter spec into reporter name and kv-pair options.
- `Optional< ColourMode > Catch::Detail::stringToColourMode (StringRef colourMode)`
- `Optional< ReporterSpec > Catch::parseReporterSpec (StringRef reporterSpec)`
- `template<typename T >`
`ParserResult Catch::Clara::Detail::convertInto (std::string const &source, T &target)`
- `ParserResult Catch::Clara::Detail::convertInto (std::string const &source, std::string &target)`
- `ParserResult Catch::Clara::Detail::convertInto (std::string const &source, bool &target)`
- `template<typename ArgType , typename L >`
`auto Catch::Clara::Detail::invokeLambda (L const &lambda, std::string const &arg) -> ParserResult`
- `Clara::Parser Catch::makeCommandLineParser (ConfigData &config)`
- `void Catch::formatReconstructedExpression (std::ostream &os, std::string const &lhs, StringRef op, std::string const &rhs)`
- `template<typename LhsT , typename RhsT >`
`auto Catch::compareEqual (LhsT const &lhs, RhsT const &rhs) -> bool`
- `template<typename T >`
`auto Catch::compareEqual (T *const &lhs, int rhs) -> bool`

- `template<typename T >`
`auto Catch::compareEqual (T *const &lhs, long rhs) -> bool`
- `template<typename T >`
`auto Catch::compareEqual (int lhs, T *const &rhs) -> bool`
- `template<typename T >`
`auto Catch::compareEqual (long lhs, T *const &rhs) -> bool`
- `template<typename LhsT , typename RhsT >`
`auto Catch::compareNotEqual (LhsT const &lhs, RhsT &&rhs) -> bool`
- `template<typename T >`
`auto Catch::compareNotEqual (T *const &lhs, int rhs) -> bool`
- `template<typename T >`
`auto Catch::compareNotEqual (T *const &lhs, long rhs) -> bool`
- `template<typename T >`
`auto Catch::compareNotEqual (int lhs, T *const &rhs) -> bool`
- `template<typename T >`
`auto Catch::compareNotEqual (long lhs, T *const &rhs) -> bool`
- `void Catch::handleExceptionMatchExpr (AssertionHandler &handler, std::string const &str, StringRef matcherString)`
- `bool Catch::isThrowSafe (TestCaseHandle const &testCase, IConfig const &config)`
- `bool Catch::matchTest (TestCaseHandle const &testCase, TestSpec const &testSpec, IConfig const &config)`
- `std::vector< TestCaseHandle > Catch::filterTests (std::vector< TestCaseHandle > const &testCases, TestSpec const &testSpec, IConfig const &config)`
- `std::vector< TestCaseHandle > const & Catch::getAllTestCasesSorted (IConfig const &config)`
- `Detail::unique_ptr< ITestInvoker > Catch::makeTestInvoker (void(*testAsFunction)())`
- `template<typename C >`
`Detail::unique_ptr< ITestInvoker > Catch::makeTestInvoker (void(C::*testAsMethod)())`
- `Detail::unique_ptr< TestCaseInfo > Catch::makeTestCaseInfo (StringRef className, NameAndTags const &nameAndTags, SourceLineInfo const &lineInfo)`
- `Version const & Catch::libraryVersion ()`
- `void Catch::Generators::Detail::throw_generator_exception (char const *msg)`
Throws [GeneratorException](#) with the provided message.
- `template<typename T , typename DecayedT = std::decay_t<T>>`
`GeneratorWrapper< DecayedT > Catch::Generators::value (T &&value)`
- `template<typename T >`
`GeneratorWrapper< T > Catch::Generators::values (std::initializer_list< T > values)`
- `template<typename... Ts>`
`GeneratorWrapper< std::tuple< std::decay_t< Ts >... > > Catch::Generators::table (std::initializer_list< std::tuple< std::decay_t< Ts >... >> tuples)`
- `template<typename T , typename... Gs>`
`auto Catch::Generators::makeGenerators (GeneratorWrapper< T > &&generator, Gs &&... moreGenerators) -> Generators< T >`
- `template<typename T >`
`auto Catch::Generators::makeGenerators (GeneratorWrapper< T > &&generator) -> Generators< T >`
- `template<typename T , typename... Gs>`
`auto Catch::Generators::makeGenerators (T &&val, Gs &&... moreGenerators) -> Generators< std::decay_t< T >>`
- `template<typename T , typename U , typename... Gs>`
`auto Catch::Generators::makeGenerators (as< T >, U &&val, Gs &&... moreGenerators) -> Generators< T >`
- `auto Catch::Generators::acquireGeneratorTracker (StringRef generatorName, SourceLineInfo const &lineInfo) -> IGeneratorTracker &`
- `template<typename L >`
`auto Catch::Generators::generate (StringRef generatorName, SourceLineInfo const &lineInfo, L const &generatorExpression) -> decltype(std::declval< decltype(generatorExpression())>().get())`

- `template<typename T >`
`GeneratorWrapper< T > Catch::Generators::take (size_t target, GeneratorWrapper< T > &&generator)`
- `template<typename T, typename Predicate >`
`GeneratorWrapper< T > Catch::Generators::filter (Predicate &&pred, GeneratorWrapper< T > &&generator)`
- `template<typename T >`
`GeneratorWrapper< T > Catch::Generators::repeat (size_t repeats, GeneratorWrapper< T > &&generator)`
- `template<typename Func, typename U, typename T = FunctionReturnType<Func, U>>`
`GeneratorWrapper< T > Catch::Generators::map (Func &&function, GeneratorWrapper< U > &&generator)`
- `template<typename T >`
`GeneratorWrapper< std::vector< T > > Catch::Generators::chunk (size_t size, GeneratorWrapper< T > &&generator)`
- `std::uint32_t Catch::Generators::Detail::getSeed ()`
- `template<typename T >`
`std::enable_if_t< std::is_integral< T >::value &&!std::is_same< T, bool >::value, GeneratorWrapper< T > > Catch::Generators::random (T a, T b)`
- `template<typename T >`
`std::enable_if_t< std::is_floating_point< T >::value, GeneratorWrapper< T > > Catch::Generators::random (T a, T b)`
- `template<typename T >`
`GeneratorWrapper< T > Catch::Generators::range (T const &start, T const &end, T const &step)`
- `template<typename T >`
`GeneratorWrapper< T > Catch::Generators::range (T const &start, T const &end)`
- `template<typename InputIterator, typename InputSentinel, typename ResultType = typename std::iterator_traits<InputIterator>::value_type>`
`GeneratorWrapper< ResultType > Catch::Generators::from_range (InputIterator from, InputSentinel to)`
- `template<typename Container, typename ResultType = typename Container::value_type>`
`GeneratorWrapper< ResultType > Catch::Generators::from_range (Container const &cnt)`
- `template<typename Container >`
`constexpr auto Catch::Detail::empty (Container const &cont) -> decltype(cont.empty())`
- `template<typename T, std::size_t N>`
`constexpr bool Catch::Detail::empty (const T(&)[N]) noexcept`
- `template<typename T >`
`constexpr bool Catch::Detail::empty (std::initializer_list< T > list) noexcept`
- `template<typename Container >`
`constexpr auto Catch::Detail::size (Container const &cont) -> decltype(cont.size())`
- `template<typename T, std::size_t N>`
`constexpr std::size_t Catch::Detail::size (const T(&)[N]) noexcept`
- `void Catch::writeToDebugConsole (std::string const &text)`
- `bool Catch::isDebuggerActive ()`
- `void Catch::throw_exception (std::exception const &e)`
- `void Catch::throw_logic_error (std::string const &msg)`
- `void Catch::throw_domain_error (std::string const &msg)`
- `void Catch::throw_runtime_error (std::string const &msg)`
- `Catch::Detail::unique_ptr< EnumInfo > Catch::Detail::makeEnumInfo (StringRef enumName, StringRef allValueNames, std::vector< int > const &values)`
- `std::vector< StringRef > Catch::Detail::parseEnums (StringRef enums)`
- `bool Catch::isnan (float f)`
- `bool Catch::isnan (double d)`
- `uint32_t Catch::Detail::convertToBits (float f)`
- `uint64_t Catch::Detail::convertToBits (double d)`
- `template<typename FP >`
`uint64_t Catch::ulpDistance (FP lhs, FP rhs)`
- `auto Catch::makeStream (std::string const &filename) -> Detail::unique_ptr< IStream >`

- bool **Catch::list** (IEventListener &reporter, Config const &config)
- void **Catch::seedRng** (IConfig const &config)
- unsigned int **Catch::rngSeed** ()
- template<typename Container >
Container **Catch::createShard** (Container const &container, std::size_t const shardCount, std::size_t const shardIndex)
- void **Catch::addSingleton** (ISingleton *singleton)
- void **Catch::cleanupSingletons** ()
- std::ostream & **Catch::cout** ()
- std::ostream & **Catch::cerr** ()
- std::ostream & **Catch::clog** ()
- bool **Catch::startsWith** (std::string const &s, std::string const &prefix)
- bool **Catch::startsWith** (StringRef s, char prefix)
- bool **Catch::endsWith** (std::string const &s, std::string const &suffix)
- bool **Catch::endsWith** (std::string const &s, char suffix)
- bool **Catch::contains** (std::string const &s, std::string const &infix)
- void **Catch::toLowerInPlace** (std::string &s)
- std::string **Catch::toLower** (std::string const &s)
- char **Catch::toLower** (char c)
- std::string **Catch::trim** (std::string const &str)
Returns a new string without whitespace at the start/end.
- StringRef **Catch::trim** (StringRef ref)
Returns a substring of the original ref without whitespace. Beware lifetimes!
- std::vector< StringRef > **Catch::splitStringRef** (StringRef str, char delimiter)
- bool **Catch::replaceInPlace** (std::string &str, std::string const &replaceThis, std::string const &withThis)
- std::vector< TestCaseHandle > **Catch::sortTests** (IConfig const &config, std::vector< TestCaseHandle > const &unsortedTestCases)
- void **Catch::enforceNoDuplicateTestCases** (std::vector< TestCaseHandle > const &functions)
- TestSpec **Catch::parseTestSpec** (std::string const &arg)
- Column **Catch::TextFlow::Spacer** (size_t spaceWidth)
Creates a column that serves as an empty space of specific width.
- template<typename T >
std::string **Catch::to_string** (T const &t)
- bool **Catch::uncaught_exceptions** ()
- XmlFormatting **Catch::operator|** (XmlFormatting lhs, XmlFormatting rhs)
- XmlFormatting **Catch::operator&** (XmlFormatting lhs, XmlFormatting rhs)
- void **Catch::handleExceptionMatchExpr** (AssertionHandler &handler, StringMatcher const &matcher, StringRef matcherString)
- template<typename ArgT, typename MatcherT >
auto **Catch::makeMatchExpr** (ArgT &&arg, MatcherT const &matcher, StringRef matcherString) -> MatchExpr< ArgT, MatcherT >
- template<typename ArgT >
MatchAllOf< ArgT > **Catch::Matchers::Detail::operator&&** (MatchAllOf< ArgT > const &lhs, MatcherBase< ArgT > const &rhs)=delete
- template<typename ArgT >
MatchAllOf< ArgT > **Catch::Matchers::Detail::operator&&** (MatcherBase< ArgT > const &lhs, MatchAllOf< ArgT > const &rhs)=delete
- template<typename ArgT >
MatchAnyOf< ArgT > **Catch::Matchers::Detail::operator||** (MatchAnyOf< ArgT > const &lhs, MatcherBase< ArgT > const &rhs)=delete
- template<typename ArgT >
MatchAnyOf< ArgT > **Catch::Matchers::Detail::operator||** (MatcherBase< ArgT > const &lhs, MatchAnyOf< ArgT > const &rhs)=delete
- template<typename T >
Detail::MatchAllOf< T > **Catch::Matchers::operator&&** (MatcherBase< T > const &lhs, MatcherBase< T > const &rhs)

- `template<typename T >`
`Detail::MatchAnyOf< T > Catch::Matchers::operator|| (MatcherBase< T > const &lhs, MatcherBase< T > const &rhs)`
- `template<typename T >`
`Detail::MatchNotOf< T > Catch::Matchers::operator! (MatcherBase< T > const &matcher)`
- `template<std::size_t N, std::size_t M>`
`std::array< void const *, N+M > Catch::Matchers::Detail::array_cat (std::array< void const *, N > &&lhs, std::array< void const *, M > &&rhs)`
- `template<std::size_t N>`
`std::array< void const *, N+1 > Catch::Matchers::Detail::array_cat (std::array< void const *, N > &&lhs, void const *rhs)`
- `template<std::size_t N>`
`std::array< void const *, N+1 > Catch::Matchers::Detail::array_cat (void const *lhs, std::array< void const *, N > &&rhs)`
- `template<std::size_t N, typename Arg >`
`bool Catch::Matchers::Detail::match_all_of (Arg &&, std::array< void const *, N > const &, std::index_sequence<>)`
- `template<typename T, typename... MatcherTs, std::size_t N, typename Arg, std::size_t Idx, std::size_t... Indices>`
`bool Catch::Matchers::Detail::match_all_of (Arg &&arg, std::array< void const *, N > const &matchers, std::index_sequence< Idx, Indices... >)`
- `template<std::size_t N, typename Arg >`
`bool Catch::Matchers::Detail::match_any_of (Arg &&, std::array< void const *, N > const &, std::index_sequence<>)`
- `template<typename T, typename... MatcherTs, std::size_t N, typename Arg, std::size_t Idx, std::size_t... Indices>`
`bool Catch::Matchers::Detail::match_any_of (Arg &&arg, std::array< void const *, N > const &matchers, std::index_sequence< Idx, Indices... >)`
- `std::string Catch::Matchers::Detail::describe_multi_matcher (StringRef combine, std::string const *descriptions_begin, std::string const *descriptions_end)`
- `template<typename... MatcherTs, std::size_t... Idx>`
`std::string Catch::Matchers::Detail::describe_multi_matcher (StringRef combine, std::array< void const *, sizeof...(MatcherTs)> const &matchers, std::index_sequence< Idx... >)`
- `template<typename MatcherLHS, typename MatcherRHS >`
`std::enable_if_t< Detail::are_generic_matchers< MatcherLHS, MatcherRHS >::value, Detail::MatchAllOfGeneric< MatcherLHS, MatcherRHS > > Catch::Matchers::operator&& (MatcherLHS const &lhs, MatcherRHS const &rhs)`
- `template<typename MatcherLHS, typename MatcherRHS >`
`std::enable_if_t< Detail::are_generic_matchers< MatcherLHS, MatcherRHS >::value, Detail::MatchAnyOfGeneric< MatcherLHS, MatcherRHS > > Catch::Matchers::operator|| (MatcherLHS const &lhs, MatcherRHS const &rhs)`
- `template<typename MatcherT >`
`std::enable_if_t< Detail::is_generic_matcher< MatcherT >::value, Detail::MatchNotOfGeneric< MatcherT > > Catch::Matchers::operator! (MatcherT const &matcher)`
Wrap provided generic matcher in generic negator.
- `template<typename MatcherLHS, typename ArgRHS >`
`std::enable_if_t< Detail::is_generic_matcher< MatcherLHS >::value, Detail::MatchAllOfGeneric< MatcherLHS, MatcherBase< ArgRHS > > > Catch::Matchers::operator&& (MatcherLHS const &lhs, MatcherBase< ArgRHS > const &rhs)`
- `template<typename ArgLHS, typename MatcherRHS >`
`std::enable_if_t< Detail::is_generic_matcher< MatcherRHS >::value, Detail::MatchAllOfGeneric< MatcherBase< ArgLHS >, MatcherRHS > > Catch::Matchers::operator&& (MatcherBase< ArgLHS > const &lhs, MatcherRHS const &rhs)`
- `template<typename MatcherLHS, typename ArgRHS >`
`std::enable_if_t< Detail::is_generic_matcher< MatcherLHS >::value, Detail::MatchAnyOfGeneric< MatcherLHS, MatcherBase< ArgRHS > > > Catch::Matchers::operator|| (MatcherLHS const &lhs, MatcherBase< ArgRHS > const &rhs)`

- `template<typename ArgLHS, typename MatcherRHS >`
`std::enable_if_t< Detail::is_generic_matcher< MatcherRHS >::value, Detail::MatchAnyOfGeneric<`
`MatcherBase< ArgLHS >, MatcherRHS > > Catch::Matchers::operator|| (MatcherBase< ArgLHS >`
`const &lhs, MatcherRHS const &rhs)`
- `IsEmptyMatcher Catch::Matchers::IsEmpty ()`
Creates a matcher that accepts empty ranges/containers.
- `HasSizeMatcher Catch::Matchers::Sizels (std::size_t sz)`
Creates a matcher that accepts ranges/containers with specific size.
- `template<typename Matcher >`
`std::enable_if_t< Detail::is_matcher< Matcher >::value, SizeMatchesMatcher< Matcher > > Catch::↵`
`Matchers::Sizels (Matcher &&m)`
- `template<typename T >`
`std::enable_if_t<!Detail::is_matcher< T >::value, ContainsElementMatcher< T, std::equal_to<> > >`
`Catch::Matchers::Contains (T &&elem)`
- `template<typename Matcher >`
`std::enable_if_t< Detail::is_matcher< Matcher >::value, ContainsMatcherMatcher< Matcher > >`
`Catch::Matchers::Contains (Matcher &&matcher)`
Creates a matcher that checks whether a range contains element matching a matcher.
- `template<typename T, typename Equality >`
`ContainsElementMatcher< T, Equality > Catch::Matchers::Contains (T &&elem, Equality &&eq)`
- `ExceptionMessageMatcher Catch::Matchers::Message (std::string const &message)`
Creates a matcher that checks whether a std derived exception has the provided message.
- `WithinUlpMatcher Catch::Matchers::WithinULP (double target, uint64_t maxUlpDiff)`
Creates a matcher that accepts doubles within certain ULP range of target.
- `WithinUlpMatcher Catch::Matchers::WithinULP (float target, uint64_t maxUlpDiff)`
Creates a matcher that accepts floats within certain ULP range of target.
- `WithinAbsMatcher Catch::Matchers::WithinAbs (double target, double margin)`
Creates a matcher that accepts numbers within certain range of target.
- `WithinRelMatcher Catch::Matchers::WithinRel (double target, double eps)`
Creates a matcher that accepts doubles within certain relative range of target.
- `WithinRelMatcher Catch::Matchers::WithinRel (double target)`
*Creates a matcher that accepts doubles within 100*DBL_EPS relative range of target.*
- `WithinRelMatcher Catch::Matchers::WithinRel (float target, float eps)`
Creates a matcher that accepts doubles within certain relative range of target.
- `WithinRelMatcher Catch::Matchers::WithinRel (float target)`
*Creates a matcher that accepts floats within 100*FLT_EPS relative range of target.*
- `std::string Catch::Matchers::Detail::finalizeDescription (const std::string &desc)`
- `template<typename T, typename Pred >`
`PredicateMatcher< T, Pred > Catch::Matchers::Predicate (Pred &&predicate, std::string const &descrip-`
`tion="")`
- `template<typename Matcher >`
`AllMatchMatcher< Matcher > Catch::Matchers::AllMatch (Matcher &&matcher)`
- `template<typename Matcher >`
`NoneMatchMatcher< Matcher > Catch::Matchers::NoneMatch (Matcher &&matcher)`
- `template<typename Matcher >`
`AnyMatchMatcher< Matcher > Catch::Matchers::AnyMatch (Matcher &&matcher)`
- `StringEqualsMatcher Catch::Matchers::Equals (std::string const &str, CaseSensitive caseSensitivity=Case↵`
`Sensitive::Yes)`
Creates matcher that accepts strings that are exactly equal to `str`
- `StringContainsMatcher Catch::Matchers::ContainsSubstring (std::string const &str, CaseSensitive case↵`
`Sensitivity=CaseSensitive::Yes)`
Creates matcher that accepts strings that contain `str`
- `EndsWithMatcher Catch::Matchers::EndsWith (std::string const &str, CaseSensitive caseSensitivity=Case↵`
`Sensitive::Yes)`

- Creates matcher that accepts strings that end with `str`*
 - `StartsWithMatcher` [Catch::Matchers::StartsWith](#) (std::string const &str, CaseSensitive caseSensitivity=CaseSensitive::Yes)
- Creates matcher that accepts strings that start with `str`*
 - `RegexMatcher` [Catch::Matchers::Matches](#) (std::string const ®ex, CaseSensitive caseSensitivity=CaseSensitive::Yes)
- Creates matcher that accepts strings matching `regex`*
 - `template<typename T, typename AllocComp = std::allocator<T>, typename AllocMatch = AllocComp>`
`ContainsMatcher< T, AllocComp, AllocMatch >` [Catch::Matchers::Contains](#) (std::vector< T, AllocComp > const &comparator)
- Creates a matcher that matches vectors that contain all elements in `comparator`*
 - `template<typename T, typename Alloc = std::allocator<T>>`
`VectorContainsElementMatcher< T, Alloc >` [Catch::Matchers::VectorContains](#) (T const &comparator)
- Creates a matcher that matches vectors that contain `comparator` as an element.*
 - `template<typename T, typename AllocComp = std::allocator<T>, typename AllocMatch = AllocComp>`
`EqualsMatcher< T, AllocComp, AllocMatch >` [Catch::Matchers::Equals](#) (std::vector< T, AllocComp > const &comparator)
- Creates a matcher that matches vectors that are exactly equal to `comparator`*
 - `template<typename T, typename AllocComp = std::allocator<T>, typename AllocMatch = AllocComp>`
`ApproxMatcher< T, AllocComp, AllocMatch >` [Catch::Matchers::Approx](#) (std::vector< T, AllocComp > const &comparator)
- Creates a matcher that matches vectors that `comparator` as an element.*
 - `template<typename T, typename AllocComp = std::allocator<T>, typename AllocMatch = AllocComp>`
`UnorderedEqualsMatcher< T, AllocComp, AllocMatch >` [Catch::Matchers::UnorderedEquals](#) (std::vector< T, AllocComp > const &target)
- Creates a matcher that matches vectors that is equal to `target` modulo permutation.*
 - `std::string` [Catch::getFormattedDuration](#) (double duration)
 - `bool` [Catch::shouldShowDuration](#) (IConfig const &config, double duration)
- Should the reporter show duration of test given current configuration?*
 - `std::string` [Catch::serializeFilters](#) (std::vector< std::string > const &filters)
 - `void` [Catch::defaultListReporters](#) (std::ostream &out, std::vector< ReporterDescription > const &descriptions, Verbosity verbosity)
 - `void` [Catch::defaultListListeners](#) (std::ostream &out, std::vector< ListenerDescription > const &descriptions)
 - `void` [Catch::defaultListTags](#) (std::ostream &out, std::vector< TagInfo > const &tags, bool isFiltered)
 - `void` [Catch::defaultListTests](#) (std::ostream &out, ColourImpl *streamColour, std::vector< TestCaseHandle > const &tests, bool isFiltered, Verbosity verbosity)
 - `void` [Catch::Detail::registerReporterImpl](#) (std::string const &name, IReporterFactoryPtr reporterPtr)

Variables

- `const auto` [Catch::Benchmark::Detail::warmup_iterations](#) = 10000
- `const auto` [Catch::Benchmark::Detail::warmup_time](#) = std::chrono::milliseconds(100)
- `const auto` [Catch::Benchmark::Detail::minimum_ticks](#) = 1000
- `const auto` [Catch::Benchmark::Detail::warmup_seed](#) = 10000
- `const auto` [Catch::Benchmark::Detail::clock_resolution_estimation_time](#) = std::chrono::milliseconds(500)
- `const auto` [Catch::Benchmark::Detail::clock_cost_estimation_time_limit](#) = std::chrono::seconds(1)
- `const auto` [Catch::Benchmark::Detail::clock_cost_estimation_tick_limit](#) = 100000
- `const auto` [Catch::Benchmark::Detail::clock_cost_estimation_time](#) = std::chrono::milliseconds(10)
- `const auto` [Catch::Benchmark::Detail::clock_cost_estimation_iterations](#) = 10000
- `constexpr StringRef` [Catch::Detail::unprintableString](#) = "{?}"_sr
- `constexpr accept_many_t` [Catch::Clara::accept_many](#) {}

6.1.1 Detailed Description

This is a convenience header for Catch2. It includes **all** of Catch2 headers.

Generally the Catch2 users should use specific includes they need, but this header can be used instead for ease-of-experimentation, or just plain convenience, at the cost of (significantly) increased compilation times.

When a new header is added to either the top level folder, or to the corresponding internal subfolder, it should be added here. Headers added to the various subparts (e.g. matchers, generators, etc...), should go their respective catch-all headers.

This is a convenience header for Catch2's benchmarking. It includes **all** of Catch2 headers related to benchmarking.

Generally the Catch2 users should use specific includes they need, but this header can be used instead for ease-of-experimentation, or just plain convenience, at the cost of (significantly) increased compilation times.

When a new header is added to either the `benchmark` folder, or to the corresponding internal (detail) subfolder, it should be added here.

Wrapper for the CONFIG configuration option

When generating internal unique names, there are two options. Either we mix in the current line number, or mix in an incrementing number. We prefer the latter, using `__COUNTER__`, but users might want to use the former.

Wrapper for the WCHAR configuration option

We want to support platforms that do not provide `wchar_t`, so we sometimes have to disable providing `wchar_t` overloads through Catch2, e.g. the `StringMaker` specialization for `std::wstring`.

This is a convenience header for Catch2's Generator support. It includes **all** of Catch2 headers related to generators.

Generally the Catch2 users should use specific includes they need, but this header can be used instead for ease-of-experimentation, or just plain convenience, at the cost of (significantly) increased compilation times.

When a new header is added to either the `generators` folder, or to the corresponding internal subfolder, it should be added here.

This is a convenience header for Catch2's interfaces. It includes **all** of Catch2 headers related to interfaces.

Generally the Catch2 users should use specific includes they need, but this header can be used instead for ease-of-experimentation, or just plain convenience, at the cost of somewhat increased compilation times.

When a new header is added to either the `interfaces` folder, or to the corresponding internal subfolder, it should be added here.

Wrapper for ANDROID_LOGWRITE configuration option

We want to default to enabling it when compiled for android, but users of the library should also be able to disable it if they want to.

Wrapper for UNCAUGHT_EXCEPTIONS configuration option

For some functionality, Catch2 requires to know whether there is an active exception. Because `std::uncaught_exception` is deprecated in C++17, we want to use `std::uncaught_exceptions` if possible.

This is a convenience header for Catch2's Matcher support. It includes **all** of Catch2 headers related to matchers.

Generally the Catch2 users should use specific includes they need, but this header can be used instead for ease-of-experimentation, or just plain convenience, at the cost of increased compilation times.

When a new header is added to either the `matchers` folder, or to the corresponding internal subfolder, it should be added here.

This is a convenience header for Catch2's Reporter support. It includes **all** of Catch2 headers related to reporters, including all reporters.

Generally the Catch2 users should use specific includes they need, but this header can be used instead for ease-of-experimentation, or just plain convenience, at the cost of (significantly) increased compilation times.

When a new header (reporter) is added to either the `reporter` folder, or to the corresponding internal subfolder, it should be added here.

6.1.2 Macro Definition Documentation

6.1.2.1 CATCH_INTERNAL_DEFINE_EXPRESSION_OPERATOR

```
#define CATCH_INTERNAL_DEFINE_EXPRESSION_OPERATOR(
    op )
```

Value:

```
template<typename RhsT, std::enable_if_t<!std::is_arithmetic<std::remove_reference_t<RhsT>::value,
int> = 0> \
    friend auto operator op ( ExprLhs && lhs, RhsT && rhs ) -> BinaryExpr<LhsT, RhsT const&> { \
        return { static_cast<bool>(lhs.m_lhs op rhs), lhs.m_lhs, #op##_sr, rhs }; \
    } \
template<typename RhsT, std::enable_if_t<std::is_arithmetic<RhsT>::value, int> = 0> \
    friend auto operator op ( ExprLhs && lhs, RhsT rhs ) -> BinaryExpr<LhsT, RhsT> { \
        return { static_cast<bool>(lhs.m_lhs op rhs), lhs.m_lhs, #op##_sr, rhs }; \
    }
```

6.1.2.2 CATCH_REGISTER_LISTENER

```
#define CATCH_REGISTER_LISTENER(
    listenerType )
```

Value:

```
CATCH_INTERNAL_START_WARNINGS_SUPPRESSION
CATCH_INTERNAL_SUPPRESS_GLOBALS_WARNINGS
namespace {
    Catch::ListenerRegistrar<listenerType> INTERNAL_CATCH_UNIQUE_NAME(
        catch_internal_RegistrarFor )( #listenerType );
}
CATCH_INTERNAL_STOP_WARNINGS_SUPPRESSION
```

6.1.2.3 CATCH_REGISTER_REPORTER

```
#define CATCH_REGISTER_REPORTER(
    name,
    reporterType )
```

Value:

```
CATCH_INTERNAL_START_WARNINGS_SUPPRESSION
CATCH_INTERNAL_SUPPRESS_GLOBALS_WARNINGS
namespace {
    Catch::ReporterRegistrar<reporterType> INTERNAL_CATCH_UNIQUE_NAME(
        catch_internal_RegistrarFor )( name );
}
CATCH_INTERNAL_STOP_WARNINGS_SUPPRESSION
```

6.1.2.4 CATCH_REGISTER_TAG_ALIAS

```
#define CATCH_REGISTER_TAG_ALIAS(
    alias,
    spec )
```

Value:

```
CATCH_INTERNAL_START_WARNINGS_SUPPRESSION \
CATCH_INTERNAL_SUPPRESS_GLOBALS_WARNINGS \
namespace{ Catch::RegistrarForTagAliases INTERNAL_CATCH_UNIQUE_NAME( AutoRegisterTagAlias )( alias,
    spec, CATCH_INTERNAL_LINEINFO ); } \
CATCH_INTERNAL_STOP_WARNINGS_SUPPRESSION
```

6.1.2.5 GENERATE

```
#define GENERATE(
    ... )
```

Value:

```
Catch::Generators::generate( INTERNAL_CATCH_STRINGIZE(INTERNAL_CATCH_UNIQUE_NAME(generator)), \
    CATCH_INTERNAL_LINEINFO, \
    [ ]{ using namespace Catch::Generators; return makeGenerators( __VA_ARGS__
); } )
```

6.1.2.6 GENERATE_COPY

```
#define GENERATE_COPY(
    ... )
```

Value:

```
Catch::Generators::generate( INTERNAL_CATCH_STRINGIZE(INTERNAL_CATCH_UNIQUE_NAME(generator)), \
    CATCH_INTERNAL_LINEINFO, \
    [=]{ using namespace Catch::Generators; return makeGenerators( __VA_ARGS__
); } )
```

6.1.2.7 GENERATE_REF

```
#define GENERATE_REF(
    ... )
```

Value:

```
Catch::Generators::generate( INTERNAL_CATCH_STRINGIZE(INTERNAL_CATCH_UNIQUE_NAME(generator)), \
    CATCH_INTERNAL_LINEINFO, \
    [&]{ using namespace Catch::Generators; return makeGenerators( __VA_ARGS__
); } )
```

6.1.2.8 INTERNAL_CATCH_BENCHMARK

```
#define INTERNAL_CATCH_BENCHMARK(  
    BenchmarkName,  
    name,  
    benchmarkIndex )
```

Value:

```
if( Catch::Benchmark::Benchmark BenchmarkName{name} ) \  
    BenchmarkName = [&](int benchmarkIndex)
```

6.1.2.9 INTERNAL_CATCH_BENCHMARK_ADVANCED

```
#define INTERNAL_CATCH_BENCHMARK_ADVANCED(  
    BenchmarkName,  
    name )
```

Value:

```
if( Catch::Benchmark::Benchmark BenchmarkName{name} ) \  
    BenchmarkName = [&]
```

6.1.2.10 INTERNAL_CATCH_CAPTURE

```
#define INTERNAL_CATCH_CAPTURE(  
    varName,  
    macroName,  
    ... )
```

Value:

```
Catch::Capturer varName( macroName, CATCH_INTERNAL_LINEINFO, Catch::ResultWas::Info, #__VA_ARGS__ ); \  
varName.captureValues( 0, __VA_ARGS__ )
```

6.1.2.11 INTERNAL_CATCH_DECLARE_SIG_TEST1

```
#define INTERNAL_CATCH_DECLARE_SIG_TEST1(  
    TestName,  
    signature )
```

Value:

```
template<INTERNAL_CATCH_REMOVE_PARENS(signature)>\  
static void TestName()
```

6.1.2.12 INTERNAL_CATCH_DECLARE_SIG_TEST_METHOD1

```
#define INTERNAL_CATCH_DECLARE_SIG_TEST_METHOD1(
    TestName,
    ClassName,
    signature )
```

Value:

```
template<typename TestType> \
struct TestName : INTERNAL_CATCH_REMOVE_PARENS(ClassName)<TestType> { \
    void test();\
}
```

6.1.2.13 INTERNAL_CATCH_DECLARE_SIG_TEST_METHOD_X

```
#define INTERNAL_CATCH_DECLARE_SIG_TEST_METHOD_X(
    TestName,
    ClassName,
    signature,
    ... )
```

Value:

```
template<INTERNAL_CATCH_REMOVE_PARENS(signature)> \
struct TestName : INTERNAL_CATCH_REMOVE_PARENS(ClassName)<__VA_ARGS__> { \
    void test();\
}
```

6.1.2.14 INTERNAL_CATCH_DECLARE_SIG_TEST_X

```
#define INTERNAL_CATCH_DECLARE_SIG_TEST_X(
    TestName,
    signature,
    ... )
```

Value:

```
template<INTERNAL_CATCH_REMOVE_PARENS(signature)>\
static void TestName()
```

6.1.2.15 INTERNAL_CATCH_DEFINE_SIG_TEST1

```
#define INTERNAL_CATCH_DEFINE_SIG_TEST1(
    TestName,
    signature )
```

Value:

```
template<INTERNAL_CATCH_REMOVE_PARENS(signature)>\
static void TestName()
```

6.1.2.16 INTERNAL_CATCH_DEFINE_SIG_TEST_METHOD1

```
#define INTERNAL_CATCH_DEFINE_SIG_TEST_METHOD1(
    TestName,
    signature )
```

Value:

```
template<typename TestType> \
void INTERNAL_CATCH_MAKE_NAMESPACE( TestName )::TestName<TestType>::test()
```

6.1.2.17 INTERNAL_CATCH_DEFINE_SIG_TEST_METHOD_X

```
#define INTERNAL_CATCH_DEFINE_SIG_TEST_METHOD_X(
    TestName,
    signature,
    ... )
```

Value:

```
template<INTERNAL_CATCH_REMOVE_PARENS( signature )> \
void INTERNAL_CATCH_MAKE_NAMESPACE( TestName )::TestName<__VA_ARGS__>::test()
```

6.1.2.18 INTERNAL_CATCH_DEFINE_SIG_TEST_X

```
#define INTERNAL_CATCH_DEFINE_SIG_TEST_X(
    TestName,
    signature,
    ... )
```

Value:

```
template<INTERNAL_CATCH_REMOVE_PARENS( signature )>\
static void TestName()
```

6.1.2.19 INTERNAL_CATCH_DYNAMIC_SECTION

```
#define INTERNAL_CATCH_DYNAMIC_SECTION(
    ... )
```

Value:

```
CATCH_INTERNAL_START_WARNINGS_SUPPRESSION \
CATCH_INTERNAL_SUPPRESS_UNUSED_VARIABLE_WARNINGS \
if ( Catch::Section const& INTERNAL_CATCH_UNIQUE_NAME( catch_internal_Section ) = Catch::SectionInfo(
    CATCH_INTERNAL_LINEINFO, (Catch::ReusableStringStream() << __VA_ARGS__).str() ) ) \
CATCH_INTERNAL_STOP_WARNINGS_SUPPRESSION
```

6.1.2.20 INTERNAL_CATCH_ELSE

```
#define INTERNAL_CATCH_ELSE(
    macroName,
    resultDisposition,
    ... )
```

Value:

```
INTERNAL_CATCH_TEST( macroName, resultDisposition, __VA_ARGS__ ); \
if( !Catch::getResultCapture().lastAssertionPassed() )
```

6.1.2.21 INTERNAL_CATCH_IF

```
#define INTERNAL_CATCH_IF(
    macroName,
    resultDisposition,
    ... )
```

Value:

```
INTERNAL_CATCH_TEST( macroName, resultDisposition, __VA_ARGS__ ); \
if( Catch::getResultCapture().lastAssertionPassed() )
```

6.1.2.22 INTERNAL_CATCH_METHOD_AS_TEST_CASE

```
#define INTERNAL_CATCH_METHOD_AS_TEST_CASE(
    QualifiedMethod,
    ... )
```

Value:

```
CATCH_INTERNAL_START_WARNINGS_SUPPRESSION \
CATCH_INTERNAL_SUPPRESS_GLOBALS_WARNINGS \
namespace{ Catch::AutoReg INTERNAL_CATCH_UNIQUE_NAME( autoRegistrar )( Catch::makeTestInvoker(
&QualifiedMethod ), CATCH_INTERNAL_LINEINFO, "&" #QualifiedMethod, Catch::NameAndTags{ __VA_ARGS__ }
); } /* NOLINT */ \
CATCH_INTERNAL_STOP_WARNINGS_SUPPRESSION
```

6.1.2.23 INTERNAL_CATCH_MSG

```
#define INTERNAL_CATCH_MSG(
    macroName,
    messageType,
    resultDisposition,
    ... )
```

Value:

```
do { \
    Catch::AssertionHandler catchAssertionHandler( macroName##_catch_sr, CATCH_INTERNAL_LINEINFO,
    Catch::StringRef(), resultDisposition ); \
    catchAssertionHandler.handleMessage( messageType, ( Catch::MessageStream() « __VA_ARGS__ +
    ::Catch::StreamEndStop() ).m_stream.str() ); \
    INTERNAL_CATCH_REACT( catchAssertionHandler ) \
} while( false )
```


6.1.2.24 INTERNAL_CATCH_NO_THROW

```
#define INTERNAL_CATCH_NO_THROW(
    macroName,
    resultDisposition,
    ... )
```

Value:

```
do { \
    Catch::AssertionHandler catchAssertionHandler( macroName##_catch_sr, CATCH_INTERNAL_LINEINFO,
    CATCH_INTERNAL_STRINGIFY(__VA_ARGS__), resultDisposition ); \
    try { \
        static_cast<void>(__VA_ARGS__); \
        catchAssertionHandler.handleExceptionNotThrownAsExpected(); \
    } \
    catch( ... ) { \
        catchAssertionHandler.handleUnexpectedInflightException(); \
    } \
    INTERNAL_CATCH_REACT( catchAssertionHandler ) \
} while( false )
```

6.1.2.25 INTERNAL_CATCH_NTTP_1

```
#define INTERNAL_CATCH_NTTP_1(
    signature,
    ... )
```

Value:

```
template<INTERNAL_CATCH_REMOVE_PARENS(signature)> struct Nttp{};\
template<INTERNAL_CATCH_REMOVE_PARENS(signature)>\
constexpr auto get_wrapper() noexcept -> Nttp<__VA_ARGS__> { return {}; } \
template<template<INTERNAL_CATCH_REMOVE_PARENS(signature)> class...> struct NttpTemplateTypeList{};\
template<template<INTERNAL_CATCH_REMOVE_PARENS(signature)> class...Cs>\
constexpr auto get_wrapper() noexcept -> NttpTemplateTypeList<Cs...> { return {}; } \
\
template< template<INTERNAL_CATCH_REMOVE_PARENS(signature)> class Container,\
template<INTERNAL_CATCH_REMOVE_PARENS(signature)> class List,\
INTERNAL_CATCH_REMOVE_PARENS(signature)>\
struct rewrap<NttpTemplateTypeList<Container>, List<__VA_ARGS__> { using type =
TypeList<Container<__VA_ARGS__>; };\
template< template<INTERNAL_CATCH_REMOVE_PARENS(signature)> class Container,\
template<INTERNAL_CATCH_REMOVE_PARENS(signature)> class List,\
INTERNAL_CATCH_REMOVE_PARENS(signature), typename...Elements>\
struct rewrap<NttpTemplateTypeList<Container>, List<__VA_ARGS__>, Elements...> { using type = typename
append<TypeList<Container<__VA_ARGS__>, typename rewrap<NttpTemplateTypeList<Container>,
Elements...>::type>::type; };\
template<template <typename...> class Final, template<INTERNAL_CATCH_REMOVE_PARENS(signature)>
class...Containers, typename...Types>\
struct create<Final, NttpTemplateTypeList<Containers...>, TypeList<Types...> { using type = typename
append<Final<>, typename rewrap<NttpTemplateTypeList<Containers>, Types...>::type...>::type; };
```

6.1.2.26 INTERNAL_CATCH_NTTP_REGISTER

```
#define INTERNAL_CATCH_NTTP_REGISTER(
    TestFunc,
    signature,
    ... )
```

Value:

```
template<INTERNAL_CATCH_REMOVE_PARENS(signature)>\
void reg_test(Nttp<__VA_ARGS__>, Catch::NameAndTags nameAndTags)\
{\
    Catch::AutoReg( Catch::makeTestInvoker(&TestFunc<__VA_ARGS__>), CATCH_INTERNAL_LINEINFO,
    Catch::StringRef(), nameAndTags);\
}
```

6.1.2.27 INTERNAL_CATCH_NTTP_REGISTER0

```
#define INTERNAL_CATCH_NTTP_REGISTER0(
    TestFunc,
    signature )
```

Value:

```
template<typename Type>\
void reg_test(TypeList<Type>, Catch::NameAndTags nameAndTags)\
{\
    Catch::AutoReg( Catch::makeTestInvoker(&TestFunc<Type>), CATCH_INTERNAL_LINEINFO,
    Catch::StringRef(), nameAndTags);\
}
```

6.1.2.28 INTERNAL_CATCH_NTTP_REGISTER_METHOD

```
#define INTERNAL_CATCH_NTTP_REGISTER_METHOD(
    TestName,
    signature,
    ... )
```

Value:

```
template<INTERNAL_CATCH_REMOVE_PARENS(signature)>\
void reg_test(Nttp<__VA_ARGS__>, Catch::StringRef className, Catch::NameAndTags nameAndTags)\
{\
    Catch::AutoReg( Catch::makeTestInvoker(&TestName<__VA_ARGS__>::test), CATCH_INTERNAL_LINEINFO,
    className, nameAndTags);\
}
```

6.1.2.29 INTERNAL_CATCH_NTTP_REGISTER_METHOD0

```
#define INTERNAL_CATCH_NTTP_REGISTER_METHOD0(
    TestName,
    signature,
    ... )
```

Value:

```
template<typename Type>\
void reg_test(TypeList<Type>, Catch::StringRef className, Catch::NameAndTags nameAndTags)\
{\
    Catch::AutoReg( Catch::makeTestInvoker(&TestName<Type>::test), CATCH_INTERNAL_LINEINFO, className,
    nameAndTags);\
}
```

6.1.2.30 INTERNAL_CATCH_REGISTER_ENUM

```
#define INTERNAL_CATCH_REGISTER_ENUM(
    enumName,
    ... )
```

Value:

```
namespace Catch { \
    template<> struct StringMaker<enumName> { \
        static std::string convert( enumName value ) { \
            static const auto& enumInfo =
            ::Catch::getMutableRegistryHub().getMutableEnumValuesRegistry().registerEnum( #enumName,
            #__VA_ARGS__, { __VA_ARGS__ } ); \
            return static_cast<std::string>(enumInfo.lookup( static_cast<int>( value ) )); \
        } \
    }; \
}
```

6.1.2.31 INTERNAL_CATCH_REGISTER_TESTCASE

```
#define INTERNAL_CATCH_REGISTER_TESTCASE(
    Function,
    ... )
```

Value:

```
do { \
    CATCH_INTERNAL_START_WARNINGS_SUPPRESSION \
    CATCH_INTERNAL_SUPPRESS_GLOBALS_WARNINGS \
    Catch::AutoReg INTERNAL_CATCH_UNIQUE_NAME( autoRegistrar )( Catch::makeTestInvoker( Function ),
    CATCH_INTERNAL_LINEINFO, Catch::StringRef(), Catch::NameAndTags{ __VA_ARGS__ } ); /* NOLINT */ \
    CATCH_INTERNAL_STOP_WARNINGS_SUPPRESSION \
} while(false)
```

6.1.2.32 INTERNAL_CATCH_SECTION

```
#define INTERNAL_CATCH_SECTION(
    ... )
```

Value:

```
CATCH_INTERNAL_START_WARNINGS_SUPPRESSION \
CATCH_INTERNAL_SUPPRESS_UNUSED_VARIABLE_WARNINGS \
if( Catch::Section const& INTERNAL_CATCH_UNIQUE_NAME( catch_internal_section ) = Catch::SectionInfo(
    CATCH_INTERNAL_LINEINFO, __VA_ARGS__ ) ) \
CATCH_INTERNAL_STOP_WARNINGS_SUPPRESSION
```

6.1.2.33 INTERNAL_CATCH_TEMPLATE_LIST_TEST_CASE_2

```
#define INTERNAL_CATCH_TEMPLATE_LIST_TEST_CASE_2(
    TestName,
    TestFunc,
    Name,
    Tags,
    TmplList )
```

Value:

```
CATCH_INTERNAL_START_WARNINGS_SUPPRESSION \
CATCH_INTERNAL_SUPPRESS_GLOBALS_WARNINGS \
CATCH_INTERNAL_SUPPRESS_UNUSED_TEMPLATE_WARNINGS \
CATCH_INTERNAL_SUPPRESS_UNUSED_VARIABLE_WARNINGS \
template<typename TestType> static void TestFunc(); \
namespace { \
    namespace INTERNAL_CATCH_MAKE_NAMESPACE( TestName ) { \
        INTERNAL_CATCH_TYPE_GEN \
        template<typename... Types> \
        struct TestName { \
            void reg_tests() { \
                size_t index = 0; \
                using expander = size_t[]; \
                (void)expander{ Catch::AutoReg( Catch::makeTestInvoker( &TestFunc<Types> ), \
                CATCH_INTERNAL_LINEINFO, Catch::StringRef(), Catch::NameAndTags{ Name " - " + \
                std::string(INTERNAL_CATCH_STRINGIZE(TmplList)) + " - " + std::to_string(index), Tags } ), \
                index++)... }; /* NOLINT */ \
            } \
        }; \
        static int INTERNAL_CATCH_UNIQUE_NAME( globalRegistrar ) = []() { \
            using TestInit = typename convert<TestName, TmplList>::type; \
            TestInit t; \
            t.reg_tests(); \
            return 0; \
        }(); \
    } \
    CATCH_INTERNAL_STOP_WARNINGS_SUPPRESSION \
    template<typename TestType> \
    static void TestFunc()
```

6.1.2.34 INTERNAL_CATCH_TEMPLATE_LIST_TEST_CASE_METHOD_2

```
#define INTERNAL_CATCH_TEMPLATE_LIST_TEST_CASE_METHOD_2(
    TestNameClass,
    TestName,
    ClassName,
    Name,
    Tags,
    TmplList )
```

Value:

```
CATCH_INTERNAL_START_WARNINGS_SUPPRESSION \
CATCH_INTERNAL_SUPPRESS_GLOBALS_WARNINGS \
CATCH_INTERNAL_SUPPRESS_UNUSED_TEMPLATE_WARNINGS \
CATCH_INTERNAL_SUPPRESS_UNUSED_VARIABLE_WARNINGS \
template<typename TestType> \
struct TestName : INTERNAL_CATCH_REMOVE_PARENS(ClassName <TestType>) { \
    void test(); \
}; \
namespace { \
namespace INTERNAL_CATCH_MAKE_NAMESPACE(TestName) { \
    INTERNAL_CATCH_TYPE_GEN \
    template<typename...Types> \
    struct TestNameClass{ \
        void reg_tests(){ \
            size_t index = 0; \
            using expander = size_t[]; \
            (void)expander{(Catch::AutoReg( Catch::makeTestInvoker( &TestName<Types>::test ), \
CATCH_INTERNAL_LINEINFO, #ClassName, Catch::NameAndTags{ Name " - " + \
std::string(INTERNAL_CATCH_STRINGIZE(TmplList)) + " - " + std::to_string(index), Tags } ), \
index++)... }; /* NOLINT */ \
        } \
    }; \
    static int INTERNAL_CATCH_UNIQUE_NAME( globalRegistrar ) = [](){ \
        using TestInit = typename convert<TestNameClass, TmplList>::type; \
        TestInit t; \
        t.reg_tests(); \
        return 0; \
    }(); \
} \
CATCH_INTERNAL_STOP_WARNINGS_SUPPRESSION \
template<typename TestType> \
void TestName<TestType>::test()
```

6.1.2.35 INTERNAL_CATCH_TEMPLATE_TEST_CASE_2

```
#define INTERNAL_CATCH_TEMPLATE_TEST_CASE_2(
    TestName,
    TestFunc,
    Name,
    Tags,
    Signature,
    ... )
```

Value:

```
CATCH_INTERNAL_START_WARNINGS_SUPPRESSION \
CATCH_INTERNAL_SUPPRESS_GLOBALS_WARNINGS \
CATCH_INTERNAL_SUPPRESS_ZERO_VARIADIC_WARNINGS \
CATCH_INTERNAL_SUPPRESS_UNUSED_TEMPLATE_WARNINGS \
CATCH_INTERNAL_SUPPRESS_UNUSED_VARIABLE_WARNINGS \
INTERNAL_CATCH_DECLARE_SIG_TEST(TestFunc, INTERNAL_CATCH_REMOVE_PARENS(Signature)); \
namespace { \
namespace INTERNAL_CATCH_MAKE_NAMESPACE(TestName) { \
    INTERNAL_CATCH_TYPE_GEN \
    INTERNAL_CATCH_NTTP_GEN(INTERNAL_CATCH_REMOVE_PARENS(Signature)) \
    INTERNAL_CATCH_NTTP_REG_GEN(TestFunc, INTERNAL_CATCH_REMOVE_PARENS(Signature)) \
    template<typename...Types> \
    struct TestName{ \
        TestName() { \
            size_t index = 0; \

```

```

        constexpr char const* tmpl_types[] =
{CATCH_REC_LIST(INTERNAL_CATCH_STRINGIZE_WITHOUT_PARENS, __VA_ARGS__)};\
    using expander = size_t[];\
    (void)expander{(reg_test(Types{}, Catch::NameAndTags{ Name " - " +
std::string(tmpl_types[index]), Tags } ), index++)... };/* NOLINT */ \
    }\
};\
    static int INTERNAL_CATCH_UNIQUE_NAME( globalRegistrar ) = [](){\
    TestName<INTERNAL_CATCH_MAKE_TYPE_LISTS_FROM_TYPES(__VA_ARGS__)>();\
    return 0;\
}();\
}\
}\
CATCH_INTERNAL_STOP_WARNINGS_SUPPRESSION \
INTERNAL_CATCH_DEFINE_SIG_TEST (TestFunc, INTERNAL_CATCH_REMOVE_PARENS (Signature))

```

6.1.2.36 INTERNAL_CATCH_TEMPLATE_TEST_CASE_METHOD_2

```
#define INTERNAL_CATCH_TEMPLATE_TEST_CASE_METHOD_2(
```

```

    TestNameClass,
    TestName,
    ClassName,
    Name,
    Tags,
    Signature,
    ... )

```

Value:

```

CATCH_INTERNAL_START_WARNINGS_SUPPRESSION \
CATCH_INTERNAL_SUPPRESS_GLOBALS_WARNINGS \
CATCH_INTERNAL_SUPPRESS_ZERO_VARIADIC_WARNINGS \
CATCH_INTERNAL_SUPPRESS_UNUSED_TEMPLATE_WARNINGS \
CATCH_INTERNAL_SUPPRESS_UNUSED_VARIABLE_WARNINGS \
namespace {\
namespace INTERNAL_CATCH_MAKE_NAMESPACE(TestName){ \
    INTERNAL_CATCH_TYPE_GEN\
    INTERNAL_CATCH_NTTP_GEN(INTERNAL_CATCH_REMOVE_PARENS(Signature))\
    INTERNAL_CATCH_DECLARE_SIG_TEST_METHOD(TestName, ClassName,\
INTERNAL_CATCH_REMOVE_PARENS(Signature));\
    INTERNAL_CATCH_NTTP_REG_METHOD_GEN(TestName, INTERNAL_CATCH_REMOVE_PARENS(Signature))\
    template<typename...Types> \
    struct TestNameClass{\
        TestNameClass(){\
            size_t index = 0;\
            constexpr char const* tmpl_types[] = \
{CATCH_REC_LIST(INTERNAL_CATCH_STRINGIZE_WITHOUT_PARENS, __VA_ARGS__)};\
            using expander = size_t[];\
            (void)expander{(reg_test(Types{}, #ClassName, Catch::NameAndTags{ Name " - " +
std::string(tmpl_types[index]), Tags } ), index++)... };/* NOLINT */ \
            }\
        }\
        static int INTERNAL_CATCH_UNIQUE_NAME( globalRegistrar ) = [](){\
            TestNameClass<INTERNAL_CATCH_MAKE_TYPE_LISTS_FROM_TYPES(__VA_ARGS__)>();\
            return 0;\
        }();\
    }\
}\
CATCH_INTERNAL_STOP_WARNINGS_SUPPRESSION \
INTERNAL_CATCH_DEFINE_SIG_TEST_METHOD(TestName, INTERNAL_CATCH_REMOVE_PARENS(Signature))

```

6.1.2.37 INTERNAL_CATCH_TEST

```
#define INTERNAL_CATCH_TEST(
    macroName,
    resultDisposition,
    ... )

```

Value:

```

do { /* NOLINT(bugprone-infinite-loop) */ \
    /* The expression should not be evaluated, but warnings should hopefully be checked */ \
    CATCH_INTERNAL_IGNORE_BUT_WARN(__VA_ARGS__); \
    Catch::AssertionHandler catchAssertionHandler( macroName##_catch_sr, CATCH_INTERNAL_LINEINFO,
    CATCH_INTERNAL_STRINGIFY(__VA_ARGS__), resultDisposition ); \
    INTERNAL_CATCH_TRY { \
        CATCH_INTERNAL_START_WARNINGS_SUPPRESSION \
        CATCH_INTERNAL_SUPPRESS_PARENTHESES_WARNINGS \
        catchAssertionHandler.handleExpr( Catch::Decomposer() <= __VA_ARGS__ ); \
        CATCH_INTERNAL_STOP_WARNINGS_SUPPRESSION \
    } INTERNAL_CATCH_CATCH( catchAssertionHandler ) \
    INTERNAL_CATCH_REACT( catchAssertionHandler ) \
} while( (void)0, (false) && static_cast<const bool&>( !( __VA_ARGS__ ) ) )

```

6.1.2.38 INTERNAL_CATCH_TEST_CASE_METHOD2

```

#define INTERNAL_CATCH_TEST_CASE_METHOD2(
    TestName,
    ClassName,
    ... )

```

Value:

```

CATCH_INTERNAL_START_WARNINGS_SUPPRESSION \
CATCH_INTERNAL_SUPPRESS_GLOBALS_WARNINGS \
namespace{ \
    struct TestName : INTERNAL_CATCH_REMOVE_PARENS(ClassName) { \
        void test(); \
    }; \
    Catch::AutoReg INTERNAL_CATCH_UNIQUE_NAME( autoRegistrar ) ( Catch::makeTestInvoker(
    &TestName::test ), CATCH_INTERNAL_LINEINFO, #ClassName, Catch::NameAndTags{ __VA_ARGS__ } ); /*
    NOLINT */ \
} \
CATCH_INTERNAL_STOP_WARNINGS_SUPPRESSION \
void TestName::test()

```

6.1.2.39 INTERNAL_CATCH_TESTCASE2

```

#define INTERNAL_CATCH_TESTCASE2(
    TestName,
    ... )

```

Value:

```

static void TestName(); \
CATCH_INTERNAL_START_WARNINGS_SUPPRESSION \
CATCH_INTERNAL_SUPPRESS_GLOBALS_WARNINGS \
namespace{ \
    Catch::AutoReg INTERNAL_CATCH_UNIQUE_NAME( autoRegistrar ) ( Catch::makeTestInvoker(
    &TestName ), CATCH_INTERNAL_LINEINFO, Catch::StringRef(), Catch::NameAndTags{ __VA_ARGS__ } ); } /*
    NOLINT */ \
CATCH_INTERNAL_STOP_WARNINGS_SUPPRESSION \
static void TestName()

```

6.1.2.40 INTERNAL_CATCH_THROWS

```
#define INTERNAL_CATCH_THROWS(
    macroName,
    resultDisposition,
    ... )
```

Value:

```
do { \
    Catch::AssertionHandler catchAssertionHandler( macroName##_catch_sr, CATCH_INTERNAL_LINEINFO,
    CATCH_INTERNAL_STRINGIFY(__VA_ARGS__), resultDisposition); \
    if( catchAssertionHandler.allowThrows() ) \
        try { \
            static_cast<void>(__VA_ARGS__); \
            catchAssertionHandler.handleUnexpectedExceptionNotThrown(); \
        } \
        catch( ... ) { \
            catchAssertionHandler.handleExceptionThrownAsExpected(); \
        } \
    else \
        catchAssertionHandler.handleThrowingCallSkipped(); \
    INTERNAL_CATCH_REACT( catchAssertionHandler ) \
} while( false )
```

6.1.2.41 INTERNAL_CATCH_THROWS_AS

```
#define INTERNAL_CATCH_THROWS_AS(
    macroName,
    exceptionType,
    resultDisposition,
    expr )
```

Value:

```
do { \
    Catch::AssertionHandler catchAssertionHandler( macroName##_catch_sr, CATCH_INTERNAL_LINEINFO,
    CATCH_INTERNAL_STRINGIFY(expr) ", " CATCH_INTERNAL_STRINGIFY(exceptionType), resultDisposition ); \
    if( catchAssertionHandler.allowThrows() ) \
        try { \
            static_cast<void>(expr); \
            catchAssertionHandler.handleUnexpectedExceptionNotThrown(); \
        } \
        catch( exceptionType const& ) { \
            catchAssertionHandler.handleExceptionThrownAsExpected(); \
        } \
        catch( ... ) { \
            catchAssertionHandler.handleUnexpectedInflightException(); \
        } \
    else \
        catchAssertionHandler.handleThrowingCallSkipped(); \
    INTERNAL_CATCH_REACT( catchAssertionHandler ) \
} while( false )
```

6.1.2.42 INTERNAL_CATCH_THROWS_MATCHES

```
#define INTERNAL_CATCH_THROWS_MATCHES(
    macroName,
    exceptionType,
    resultDisposition,
    matcher,
    ... )
```

Value:

```

do { \
    Catch::AssertionHandler catchAssertionHandler( macroName##_catch_sr, CATCH_INTERNAL_LINEINFO,
    CATCH_INTERNAL_STRINGIFY(__VA_ARGS__) ", " CATCH_INTERNAL_STRINGIFY(exceptionType) ", "
    CATCH_INTERNAL_STRINGIFY(matcher), resultDisposition ); \
    if( catchAssertionHandler.allowThrows() ) \
        try { \
            static_cast<void>(__VA_ARGS__ ); \
            catchAssertionHandler.handleUnexpectedExceptionNotThrown(); \
        } \
        catch( exceptionType const& ex ) { \
            catchAssertionHandler.handleExpr( Catch::makeMatchExpr( ex, matcher, #matcher##_catch_sr )
    ); \
        } \
        catch( ... ) { \
            catchAssertionHandler.handleUnexpectedInflightException(); \
        } \
    else \
        catchAssertionHandler.handleThrowingCallSkipped(); \
    INTERNAL_CATCH_REACT( catchAssertionHandler ) \
} while( false )

```

6.1.2.43 INTERNAL_CATCH_THROWS_STR_MATCHES

```

#define INTERNAL_CATCH_THROWS_STR_MATCHES(
    macroName,
    resultDisposition,
    matcher,
    ... )

```

Value:

```

do { \
    Catch::AssertionHandler catchAssertionHandler( macroName##_catch_sr, CATCH_INTERNAL_LINEINFO,
    CATCH_INTERNAL_STRINGIFY(__VA_ARGS__) ", " CATCH_INTERNAL_STRINGIFY(matcher), resultDisposition ); \
    if( catchAssertionHandler.allowThrows() ) \
        try { \
            static_cast<void>(__VA_ARGS__); \
            catchAssertionHandler.handleUnexpectedExceptionNotThrown(); \
        } \
        catch( ... ) { \
            Catch::handleExceptionMatchExpr( catchAssertionHandler, matcher, #matcher##_catch_sr ); \
        } \
    else \
        catchAssertionHandler.handleThrowingCallSkipped(); \
    INTERNAL_CATCH_REACT( catchAssertionHandler ) \
} while( false )

```

6.1.2.44 INTERNAL_CATCH_TRANSLATE_EXCEPTION2

```

#define INTERNAL_CATCH_TRANSLATE_EXCEPTION2(
    translatorName,
    signature )

```

Value:

```

static std::string translatorName( signature ); \
CATCH_INTERNAL_START_WARNINGS_SUPPRESSION \
CATCH_INTERNAL_SUPPRESS_GLOBALS_WARNINGS \
namespace{ Catch::ExceptionTranslatorRegistrar INTERNAL_CATCH_UNIQUE_NAME(
    catch_internal_ExceptionRegistrar )( &translatorName ); } \
CATCH_INTERNAL_STOP_WARNINGS_SUPPRESSION \
static std::string translatorName( signature )

```


6.1.2.45 INTERNAL_CHECK_THAT

```
#define INTERNAL_CHECK_THAT(
    macroName,
    matcher,
    resultDisposition,
    arg )
```

Value:

```
do { \
    Catch::AssertionHandler catchAssertionHandler( macroName##_catch_sr, CATCH_INTERNAL_LINEINFO,
    CATCH_INTERNAL_STRINGIFY(arg) ", " CATCH_INTERNAL_STRINGIFY(matcher), resultDisposition ); \
    INTERNAL_CATCH_TRY { \
        catchAssertionHandler.handleExpr( Catch::makeMatchExpr( arg, matcher, #matcher##_catch_sr ) ); \
    } INTERNAL_CATCH_CATCH( catchAssertionHandler ) \
    INTERNAL_CATCH_REACT( catchAssertionHandler ) \
} while( false )
```

6.1.3 Enumeration Type Documentation

6.1.3.1 ColourMode

```
enum Catch::ColourMode : std::uint8_t [strong]
```

Enumerator

PlatformDefault	Let Catch2 pick implementation based on platform detection.
ANSI	Use ANSI colour code escapes.
Win32	Use Win32 console colour API.
None	Don't use any colour.

6.1.3.2 GenerateFrom

```
enum Catch::GenerateFrom [strong]
```

Enumerator

Default	Currently equivalent to RandomDevice, but can change at any point.
---------	--

6.1.3.3 ResultType

```
enum Catch::Clara::Detail::ResultType [strong]
```

Denotes type of a parsing result.

Enumerator

Ok	No errors.
LogicError	Error in user-specified arguments for construction
RuntimeError	Error in parsing inputs.

6.1.4 Function Documentation

6.1.4.1 Contains() [1/2]

```
template<typename T >
std::enable_if_t

```

Creates a matcher that checks whether a range contains a specific element.

Uses `std::equal_to` to do the comparison

6.1.4.2 Contains() [2/2]

```
template<typename T , typename Equality >
ContainsElementMatcher<T, Equality> Catch::Matchers::Contains (
    T && elem,
    Equality && eq )
```

Creates a matcher that checks whether a range contains a specific element.

Uses `eq` to do the comparisons

6.1.4.3 convertIntoString()

```
std::string Catch::Detail::convertIntoString (
    StringRef string )
```

Encases `string` in quotes, and escapes invisibles if user requested it via CLI

6.1.4.4 defaultListListeners()

```
void Catch::defaultListListeners (
    std::ostream & out,
    std::vector< ListenerDescription > const & descriptions )
```

Lists listeners descriptions to the provided stream in user-friendly format

6.1.4.5 defaultListReporters()

```
void Catch::defaultListReporters (
    std::ostream & out,
    std::vector< ReporterDescription > const & descriptions,
    Verbosity verbosity )
```

Lists reporter descriptions to the provided stream in user-friendly format

Used as the default listing implementation by the first party reporter bases. The output should be backwards compatible with the output of Catch2 v2 binaries.

6.1.4.6 defaultListTags()

```
void Catch::defaultListTags (
    std::ostream & out,
    std::vector< TagInfo > const & tags,
    bool isFiltered )
```

Lists tag information to the provided stream in user-friendly format

Used as the default listing implementation by the first party reporter bases. The output should be backwards compatible with the output of Catch2 v2 binaries.

6.1.4.7 defaultListTests()

```
void Catch::defaultListTests (
    std::ostream & out,
    ColourImpl * streamColour,
    std::vector< TestCaseHandle > const & tests,
    bool isFiltered,
    Verbosity verbosity )
```

Lists test case information to the provided stream in user-friendly format

Used as the default listing implementation by the first party reporter bases. The output is backwards compatible with the output of Catch2 v2 binaries, and also supports the format specific to the old `--list-test-names-only` option, for people who used it in integrations.

6.1.4.8 makeStream()

```
auto Catch::makeStream (
    std::string const & filename ) -> Detail::unique_ptr< IStream >
```

Creates a stream wrapper that writes to specific file.

Also recognizes 4 special filenames

- `-` for stdout
- `stdout` for stdout
- `stderr` for stderr
- `debug` for platform specific debugging output

Exceptions

<i>if</i>	passed an unrecognized %-prefixed stream
-----------	--

6.1.4.9 operator&&() [1/2]

```
template<typename ArgT >
MatchAllOf<ArgT> Catch::Matchers::Detail::operator&& (
    MatchAllOf< ArgT > const & lhs,
    MatcherBase< ArgT > const & rhs ) [delete]
```

lvalue overload is intentionally deleted, users should not be trying to compose stored composition matchers

6.1.4.10 operator&&() [2/2]

```
template<typename ArgT >
MatchAllOf<ArgT> Catch::Matchers::Detail::operator&& (
    MatcherBase< ArgT > const & lhs,
    MatchAllOf< ArgT > const & rhs ) [delete]
```

lvalue overload is intentionally deleted, users should not be trying to compose stored composition matchers

6.1.4.11 operator"|"() [1/2]

```
template<typename ArgT >
MatchAnyOf<ArgT> Catch::Matchers::Detail::operator|| (
    MatchAnyOf< ArgT > const & lhs,
    MatcherBase< ArgT > const & rhs ) [delete]
```

lvalue overload is intentionally deleted, users should not be trying to compose stored composition matchers

6.1.4.12 operator"|"() [2/2]

```
template<typename ArgT >
MatchAnyOf<ArgT> Catch::Matchers::Detail::operator|| (
    MatcherBase< ArgT > const & lhs,
    MatchAnyOf< ArgT > const & rhs ) [delete]
```

lvalue overload is intentionally deleted, users should not be trying to compose stored composition matchers

6.1.4.13 parseReporterSpec()

```
Optional<ReporterSpec> Catch::parseReporterSpec (
    StringRef reporterSpec )
```

Parses provided reporter spec string into

Returns empty optional on errors, e.g.

- field that is not first and not a key+value pair
- duplicated keys in kv pair
- unknown catch reporter option
- empty key/value in an custom kv pair
- ...

6.1.4.14 Predicate()

```
template<typename T , typename Pred >
PredicateMatcher<T, Pred> Catch::Matchers::Predicate (
    Pred && predicate,
    std::string const & description = "" )
```

Creates a matcher that calls delegates `match` to the provided predicate.

The user has to explicitly specify the argument type to the matcher

6.1.4.15 registerReporterImpl()

```
void Catch::Detail::registerReporterImpl (
    std::string const & name,
    IReporterFactoryPtr reporterPtr )
```

Indirection for reporter registration, so that the error handling is independent on the reporter's concrete type

6.1.4.16 ulpDistance()

```
template<typename FP >
uint64_t Catch::ulpDistance (
    FP lhs,
    FP rhs )
```

Calculates the ULP distance between two floating point numbers

The ULP distance of two floating point numbers is the count of valid floating point numbers representable between them.

There are some exceptions between how this function counts the distance, and the interpretation of the standard as implemented. by e.g. `nextafter`. For this function it always holds that:

- $(x == y) \Rightarrow \text{ulpDistance}(x, y) == 0$ (so $\text{ulpDistance}(-0, 0) == 0$)
- $\text{ulpDistance}(\text{maxFinite}, \text{INF}) == 1$
- $\text{ulpDistance}(x, -x) == 2 * \text{ulpDistance}(x, 0)$

Precondition

```
!isnan( lhs )
!isnan( rhs )
```

floating point numbers are represented in IEEE-754 format

Index

Action
 Action< TSeq >, 22
Action< TSeq >, 21
 Action, 22
add_global_action
 Model< TSeq >, 181
AdjList, 23
 AdjList, 23
 read_edgelist, 24
Agent< TSeq >, 24
Agents< TSeq >, 26
ANSI
 catch_amalgamated.hpp, 345

Catch::always_false< T >, 28
Catch::Approx, 30
Catch::AssertionHandler, 35
Catch::AssertionInfo, 35
Catch::AssertionReaction, 36
Catch::AssertionResult, 37
Catch::AssertionResultData, 38
Catch::AssertionStats, 39
Catch::AutomakeReporter, 40
Catch::AutoReg, 41
Catch::Benchmark::Benchmark, 43
Catch::Benchmark::Chronometer, 64
Catch::Benchmark::Detail::BenchmarkFunction, 43
Catch::Benchmark::Detail::bootstrap_analysis, 47
Catch::Benchmark::Detail::ChronometerConcept, 64
Catch::Benchmark::Detail::ChronometerModel< Clock
 >, 65
Catch::Benchmark::Detail::CompleteInvoker< Result >,
 73
Catch::Benchmark::Detail::CompleteInvoker< void >,
 74
Catch::Benchmark::Detail::CompleteType< T >, 74
Catch::Benchmark::Detail::CompleteType< void >, 74
Catch::Benchmark::Detail::CompleteType< void
 >::type, 281
Catch::Benchmark::Detail::is_related< T, U >, 139
Catch::Benchmark::Detail::ObjectStorage< T, Destruct
 >, 190
Catch::Benchmark::Detail::repeater< Fun >, 210
Catch::Benchmark::Environment< Clock >, 97
Catch::Benchmark::EnvironmentEstimate< Duration >,
 98
Catch::Benchmark::Estimate< Duration >, 100
Catch::Benchmark::ExecutionPlan< Duration >, 106
Catch::Benchmark::now< Clock >, 190
Catch::Benchmark::OutlierClassification, 193

Catch::Benchmark::SampleAnalysis< Duration >, 226
Catch::Benchmark::Timing< Duration, Result >, 274
Catch::BenchmarkInfo, 44
Catch::BenchmarkStats< Duration >, 45
Catch::BinaryExpr< LhsT, RhsT >, 46
Catch::Capturer, 62
Catch::Clara::accept_many_t, 21
Catch::Clara::Arg, 33
Catch::Clara::Args, 34
Catch::Clara::Detail::BasicResult< T >, 42
Catch::Clara::Detail::BoundFlagLambda< L >, 48
Catch::Clara::Detail::BoundFlagRef, 50
Catch::Clara::Detail::BoundFlagRefBase, 52
Catch::Clara::Detail::BoundLambda< L >, 53
Catch::Clara::Detail::BoundManyLambda< L >, 55
Catch::Clara::Detail::BoundRef, 57
Catch::Clara::Detail::BoundValueRef< std::vector< T >
 >, 60
Catch::Clara::Detail::BoundValueRef< T >, 58
Catch::Clara::Detail::BoundValueRefBase, 61
Catch::Clara::Detail::ComposableParserImpl< DerivedT
 >, 75
Catch::Clara::Detail::fake_arg, 108
Catch::Clara::Detail::HelpColumns, 122
Catch::Clara::Detail::is_unary_function< F, Catch::Detail::void_t<
 decltype(std::declval< F >())(fake_arg())>
 >, 141
Catch::Clara::Detail::is_unary_function< F, typename
 >, 140
Catch::Clara::Detail::LambdaInvoker< ReturnType >,
 152
Catch::Clara::Detail::LambdaInvoker< void >, 153
Catch::Clara::Detail::ParserBase, 195
Catch::Clara::Detail::ParserRefImpl< DerivedT >, 196
Catch::Clara::Detail::ParseState, 197
Catch::Clara::Detail::ResultBase, 219
Catch::Clara::Detail::ResultValueBase< T >, 220
Catch::Clara::Detail::ResultValueBase< void >, 222
Catch::Clara::Detail::Token, 274
Catch::Clara::Detail::TokenStream, 275
Catch::Clara::Detail::UnaryLambdaTraits< L >, 282
Catch::Clara::Detail::UnaryLambdaTraits< ReturnT(ClassT::*)(Args...) const >,
 283
Catch::Clara::Detail::UnaryLambdaTraits< ReturnT(ClassT::*)(ArgT) const >,
 283
Catch::Clara::ExeName, 107
Catch::Clara::Help, 121
Catch::Clara::Opt, 191
Catch::Clara::Parser, 194

- Catch::Colour, 68
- Catch::ColourImpl, 69
 - guardColour, 70
- Catch::ColourImpl::ColourGuard, 68
 - engage, 69
- Catch::CompactReporter, 72
 - testRunEnded, 73
 - testRunStarting, 73
- Catch::Config, 76
- Catch::ConfigData, 77
- Catch::ConsoleReporter, 80
 - testRunEnded, 81
 - testRunStarting, 82
- Catch::Counts, 87
- Catch::CumulativeReporterBase, 88
 - testRunEnded, 90
 - testRunStarting, 90
- Catch::CumulativeReporterBase::Node< T, ChildNodeT >, 187
- Catch::CumulativeReporterBase::SectionNode, 230
- Catch::Decomposer, 93
- Catch::Detail::AssertionOrBenchmarkResult, 36
- Catch::Detail::CaseInsensitiveEqualTo, 63
- Catch::Detail::CaseInsensitiveLess, 63
- Catch::Detail::EnumInfo, 95
- Catch::Detail::EnumValuesRegistry, 96
- Catch::Detail::has_description< T, typename >, 118
- Catch::Detail::has_description< T, void_t< decltype(T::get_description) > >, 119
- Catch::Detail::is_range_impl< T, typename >, 137
- Catch::Detail::is_range_impl< T, void_t< decltype(begin(std::declval< T >())) > >, 138
- Catch::Detail::IsStreamInsertable< T >, 144
- Catch::Detail::make_void<... >, 156
- Catch::Detail::NonCopyable, 188
- Catch::Detail::unique_ptr< T >, 283
- Catch::ErrnoGuard, 100
- Catch::EventListenerBase, 101
 - testRunEnded, 103
 - testRunStarting, 103
- Catch::EventListenerFactory, 103
- Catch::ExceptionTranslatorRegistrar, 105
- Catch::ExceptionTranslatorRegistry, 105
- Catch::ExprLhs< LhsT >, 108
- Catch::FatalConditionHandler, 109
- Catch::FatalConditionHandlerGuard, 109
- Catch::GeneratorException, 113
- Catch::Generators::as< T >, 35
- Catch::Generators::ChunkGenerator< T >, 66
 - next, 67
- Catch::Generators::FilterGenerator< T, Predicate >, 110
 - next, 111
- Catch::Generators::FixedValuesGenerator< T >, 112
 - next, 113
- Catch::Generators::Generators< T >, 114
 - next, 115
- Catch::Generators::GeneratorUntypedBase, 116
 - countedNext, 116
 - currentElementAsString, 117
- Catch::Generators::GeneratorWrapper< T >, 117
- Catch::Generators::IGenerator< T >, 129
- Catch::Generators::IteratorGenerator< T >, 146
 - next, 147
- Catch::Generators::MapGenerator< T, U, Func >, 156
 - next, 157
- Catch::Generators::RandomFloatingGenerator< Float >, 201
 - next, 202
- Catch::Generators::RandomIntegerGenerator< Integer >, 203
 - next, 204
- Catch::Generators::RangeGenerator< T >, 204
 - next, 205
- Catch::Generators::RepeatGenerator< T >, 211
 - next, 212
- Catch::Generators::SingleValueGenerator< T >, 236
 - next, 237
- Catch::Generators::TakeGenerator< T >, 260
 - next, 261
- Catch::IConfig, 123
- Catch::IContext, 124
- Catch::IEventListener, 125
 - testRunEnded, 127
 - testRunStarting, 127
- Catch::IExceptionTranslator, 128
- Catch::IExceptionTranslatorRegistry, 128
- Catch::IGeneratorTracker, 130
- Catch::IMutableContext, 130
- Catch::IMutableEnumValuesRegistry, 131
- Catch::IMutableRegistryHub, 132
- Catch::IRegistryHub, 132
- Catch::IReporterFactory, 132
- Catch::IReporterRegistry, 133
- Catch::IResultCapture, 134
- Catch::is_callable< Fun(Args...) >, 135
- Catch::is_callable< T >, 135
- Catch::is_callable_tester, 136
- Catch::is_range< T >, 136
- Catch::ISingleton, 143
- Catch::IStream, 144
 - isConsole, 144
- Catch::ITagAliasRegistry, 145
- Catch::ITestCaseRegistry, 147
- Catch::ITestInvoker, 148
- Catch::ITransientExpression, 150
- Catch::JUnitReporter, 151
 - testRunStarting, 152
- Catch::LazyExpression, 153
- Catch::LeakDetector, 153
- Catch::lineOfChars, 155
- Catch::ListenerDescription, 155
- Catch::ListenerRegistrar< T >, 156
- Catch::Matchers::AllMatchMatcher< Matcher >, 27
- Catch::Matchers::AnyMatchMatcher< Matcher >, 29

- Catch::Matchers::ApproxMatcher< T, AllocComp, AllocMatch >, 31
- Catch::Matchers::CasedString, 63
- Catch::Matchers::ContainsElementMatcher< T, Equality >, 83
- Catch::Matchers::ContainsMatcher< T, AllocComp, AllocMatch >, 85
- Catch::Matchers::ContainsMatcherMatcher< Matcher >, 86
- Catch::Matchers::Detail::conjunction< Cond >, 78
- Catch::Matchers::Detail::conjunction< Cond, Rest... >, 79
- Catch::Matchers::Detail::MatchAllOf< ArgT >, 158
- Catch::Matchers::Detail::MatchAllOfGeneric< MatcherTs >, 159
- Catch::Matchers::Detail::MatchAnyOf< ArgT >, 161
- Catch::Matchers::Detail::MatchAnyOfGeneric< MatcherTs >, 162
- Catch::Matchers::Detail::MatchNotOf< ArgT >, 169
- Catch::Matchers::Detail::MatchNotOfGeneric< MatcherT >, 171
- Catch::Matchers::EndsWithMatcher, 94
- Catch::Matchers::EqualsMatcher< T, AllocComp, AllocMatch >, 99
- Catch::Matchers::ExceptionMessageMatcher, 104
- Catch::Matchers::HasSizeMatcher, 120
- Catch::Matchers::IsEmptyMatcher, 142
- Catch::Matchers::MatcherBase< T >, 164
- Catch::Matchers::MatcherGenericBase, 165
- Catch::Matchers::MatcherUntypedBase, 167
- Catch::Matchers::NoneMatchMatcher< Matcher >, 189
- Catch::Matchers::PredicateMatcher< T, Predicate >, 198
- Catch::Matchers::RegexMatcher, 209
- Catch::Matchers::SizeMatchesMatcher< Matcher >, 238
- Catch::Matchers::StartsWithMatcher, 241
- Catch::Matchers::StringContainsMatcher, 245
- Catch::Matchers::StringEqualsMatcher, 246
- Catch::Matchers::StringMatcherBase, 255
- Catch::Matchers::UnorderedEqualsMatcher< T, AllocComp, AllocMatch >, 284
- Catch::Matchers::VectorContainsElementMatcher< T, Alloc >, 288
- Catch::Matchers::WithinAbsMatcher, 294
- Catch::Matchers::WithinRelMatcher, 296
- Catch::Matchers::WithinUlpMatcher, 297
- Catch::MatchExpr< ArgT, MatcherT >, 168
- Catch::MessageBuilder, 172
- Catch::MessageInfo, 173
- Catch::MessageStream, 174
- Catch::MultiReporter, 183
 - testRunEnded, 185
 - testRunStarting, 185
- Catch::NameAndTags, 187
- Catch::Optional< T >, 193
- Catch::pluralise, 198
- Catch::ProcessedReporterSpec, 199
- Catch::ratio_string< Ratio >, 206
- Catch::ratio_string< std::atto >, 206
- Catch::ratio_string< std::femto >, 206
- Catch::ratio_string< std::micro >, 206
- Catch::ratio_string< std::milli >, 207
- Catch::ratio_string< std::nano >, 207
- Catch::ratio_string< std::pico >, 207
- Catch::RedirectedStdErr, 207
- Catch::RedirectedStdOut, 208
- Catch::RedirectedStream, 208
- Catch::RedirectedStreams, 208
- Catch::RegistrarForTagAliases, 210
- Catch::ReporterBase, 212
 - listListeners, 213
 - listReporters, 213
 - listTags, 214
 - listTests, 214
 - m_stream, 214
- Catch::ReporterConfig, 215
- Catch::ReporterDescription, 215
- Catch::ReporterFactory< T >, 216
- Catch::ReporterPreferences, 216
 - shouldRedirectStdOut, 217
 - shouldReportAllAssertions, 217
- Catch::ReporterRegistrar< T >, 217
- Catch::ReporterRegistry, 218
- Catch::ReporterSpec, 219
- Catch::ResultDisposition, 220
- Catch::ResultWas, 223
- Catch::ReusableStringStream, 223
- Catch::RunContext, 224
- Catch::ScopedMessage, 227
- Catch::Section, 228
- Catch::SectionEndInfo, 229
- Catch::SectionInfo, 229
- Catch::SectionStats, 231
- Catch::Session, 233
- Catch::SimplePcg32, 234
- Catch::Singleton< SingletonImplT, InterfaceT, MutableInterfaceT >, 235
- Catch::SonarQubeReporter, 239
 - testRunStarting, 240
- Catch::SourceLineInfo, 240
- Catch::StartupExceptionRegistry, 242
- Catch::StreamEndStop, 242
- Catch::StreamingReporterBase, 242
 - testRunEnded, 243
 - testRunStarting, 244
- Catch::StringMaker< bool >, 247
- Catch::StringMaker< Catch::Approx >, 247
- Catch::StringMaker< char >, 248
- Catch::StringMaker< char * >, 247
- Catch::StringMaker< char const * >, 248
- Catch::StringMaker< char[SZ]>, 248
- Catch::StringMaker< double >, 248
- Catch::StringMaker< float >, 249
- Catch::StringMaker< int >, 249
- Catch::StringMaker< long >, 249

- Catch::StringMaker< long long >, 249
- Catch::StringMaker< R C::* >, 250
- Catch::StringMaker< R, std::enable_if_t< is_range< R >::value &&!::Catch::Detail::IsStreamInsertable< R >::value >, 250
- Catch::StringMaker< signed char >, 250
- Catch::StringMaker< signed char[SZ]>, 250
- Catch::StringMaker< std::chrono::duration< Value, Ratio > >, 251
- Catch::StringMaker< std::chrono::duration< Value, std::ratio< 1 > >, 251
- Catch::StringMaker< std::chrono::duration< Value, std::ratio< 3600 > >, 251
- Catch::StringMaker< std::chrono::duration< Value, std::ratio< 60 > >, 251
- Catch::StringMaker< std::chrono::time_point< Clock, Duration > >, 252
- Catch::StringMaker< std::chrono::time_point< std::chrono::system_clock, Duration > >, 252
- Catch::StringMaker< std::nullptr_t >, 252
- Catch::StringMaker< std::string >, 252
- Catch::StringMaker< std::wstring >, 253
- Catch::StringMaker< T * >, 253
- Catch::StringMaker< T, typename >, 247
- Catch::StringMaker< T[SZ]>, 253
- Catch::StringMaker< unsigned char >, 253
- Catch::StringMaker< unsigned char[SZ]>, 254
- Catch::StringMaker< unsigned int >, 254
- Catch::StringMaker< unsigned long >, 254
- Catch::StringMaker< unsigned long long >, 254
- Catch::StringMaker< wchar_t * >, 255
- Catch::StringMaker< wchar_t const * >, 255
- Catch::StringRef, 256
 - compare, 257
- Catch::Tag, 257
- Catch::TagAlias, 258
- Catch::TagAliasRegistry, 259
- Catch::TagInfo, 259
- Catch::TAPReporter, 262
 - testRunEnded, 263
 - testRunStarting, 263
- Catch::TeamCityReporter, 264
 - testRunEnded, 265
 - testRunStarting, 265
- Catch::TestCaseHandle, 265
- Catch::TestCaseInfo, 266
- Catch::TestCaseInfoHasher, 267
- Catch::TestCaseStats, 268
- Catch::TestCaseTracking::ITracker, 148
 - findChild, 150
 - isGeneratorTracker, 150
 - isSectionTracker, 150
- Catch::TestCaseTracking::NameAndLocation, 186
- Catch::TestCaseTracking::SectionTracker, 232
 - isSectionTracker, 233
- Catch::TestCaseTracking::TrackerBase, 279
- Catch::TestCaseTracking::TrackerContext, 280
- Catch::TestFailureException, 268
- Catch::TestInvokerAsFunction, 269
- Catch::TestInvokerAsMethod< C >, 270
- Catch::TestRegistry, 271
- Catch::TestRunInfo, 272
- Catch::TestRunStats, 272
- Catch::TestSpec, 273
- Catch::TestSpec::FilterMatch, 111
- Catch::TestSpecParser, 274
- Catch::TextFlow::Column, 70
- Catch::TextFlow::Column::const_iterator, 82
- Catch::TextFlow::Columns, 71
- Catch::TextFlow::Columns::iterator, 145
- Catch::Timer, 274
- Catch::Totals, 278
- Catch::true_given< typename >, 281
- Catch::UnaryExpr< LhsT >, 282
- Catch::Version, 289
- Catch::WaitForKeypress, 293
- Catch::WarnAbout, 293
 - NoAssertions, 294
 - UnmatchedTestSpec, 294
 - What, 294
- Catch::WildcardPattern, 294
- Catch::XmlEncode, 298
- Catch::XmlReporter, 299
 - listListeners, 300
 - listReporters, 300
 - listTags, 300
 - listTests, 301
 - testRunEnded, 301
 - testRunStarting, 301
- Catch::XmlWriter, 302
 - writeAttribute, 302
- Catch::XmlWriter::ScopedElement, 226
- catch_amalgamated.hpp
 - ANSI, 345
 - CATCH_INTERNAL_DEFINE_EXPRESSION_OPERATOR, 331
 - CATCH_REGISTER_LISTENER, 331
 - CATCH_REGISTER_REPORTER, 331
 - CATCH_REGISTER_TAG_ALIAS, 331
 - ColourMode, 345
 - Contains, 346
 - convertIntoString, 346
 - Default, 345
 - defaultListListeners, 346
 - defaultListReporters, 346
 - defaultListTags, 347
 - defaultListTests, 347
 - GENERATE, 332
 - GENERATE_COPY, 332
 - GENERATE_REF, 332
 - GenerateFrom, 345
 - INTERNAL_CATCH_BENCHMARK, 332
 - INTERNAL_CATCH_BENCHMARK_ADVANCED, 333
 - INTERNAL_CATCH_CAPTURE, 333
 - INTERNAL_CATCH_DECLARE_SIG_TEST1, 333

- INTERNAL_CATCH_DECLARE_SIG_TEST_METHOD1, registerReporterImpl, 349
- INTERNAL_CATCH_DECLARE_SIG_TEST_METHOD_X, 333
- INTERNAL_CATCH_DECLARE_SIG_TEST_METHOD_X, 334
- INTERNAL_CATCH_DECLARE_SIG_TEST_X, 334
- INTERNAL_CATCH_DEFINE_SIG_TEST1, 334
- INTERNAL_CATCH_DEFINE_SIG_TEST_METHOD1, 334
- INTERNAL_CATCH_DEFINE_SIG_TEST_METHOD_X, 335
- INTERNAL_CATCH_DEFINE_SIG_TEST_X, 335
- INTERNAL_CATCH_DYNAMIC_SECTION, 335
- INTERNAL_CATCH_ELSE, 335
- INTERNAL_CATCH_IF, 336
- INTERNAL_CATCH_METHOD_AS_TEST_CASE, 336
- INTERNAL_CATCH_MSG, 336
- INTERNAL_CATCH_NO_THROW, 336
- INTERNAL_CATCH_NTTP_1, 337
- INTERNAL_CATCH_NTTP_REGISTER, 337
- INTERNAL_CATCH_NTTP_REGISTER0, 337
- INTERNAL_CATCH_NTTP_REGISTER_METHOD, 338
- INTERNAL_CATCH_NTTP_REGISTER_METHOD0, 338
- INTERNAL_CATCH_REGISTER_ENUM, 338
- INTERNAL_CATCH_REGISTER_TESTCASE, 338
- INTERNAL_CATCH_SECTION, 339
- INTERNAL_CATCH_TEMPLATE_LIST_TEST_CASE_2, 339
- INTERNAL_CATCH_TEMPLATE_LIST_TEST_CASE_METHOD_2, 339
- INTERNAL_CATCH_TEMPLATE_TEST_CASE_2, 340
- INTERNAL_CATCH_TEMPLATE_TEST_CASE_METHOD_2, 341
- INTERNAL_CATCH_TEST, 341
- INTERNAL_CATCH_TEST_CASE_METHOD2, 342
- INTERNAL_CATCH_TESTCASE2, 342
- INTERNAL_CATCH_THROWS, 342
- INTERNAL_CATCH_THROWS_AS, 343
- INTERNAL_CATCH_THROWS_MATCHES, 343
- INTERNAL_CATCH_THROWS_STR_MATCHES, 344
- INTERNAL_CATCH_TRANSLATE_EXCEPTION2, 344
- INTERNAL_CHECK_THAT, 344
- LogicError, 346
- makeStream, 347
- None, 345
- Ok, 346
- operator&&, 348
- operator| |, 348
- parseReporterSpec, 348
- PlatformDefault, 345
- Predicate, 349
- ResultType, 345
- RuntimeError, 346
- ulpDistance, 349
- Win32, 345
- Catch_global_namespace_dummy, 64
- CATCH_INTERNAL_DEFINE_EXPRESSION_OPERATOR
- catch_amalgamated.hpp, 331
- CATCH_REGISTER_LISTENER
- catch_amalgamated.hpp, 331
- CATCH_REGISTER_REPORTER
- catch_amalgamated.hpp, 331
- CATCH_REGISTER_TAG_ALIAS
- catch_amalgamated.hpp, 331
- ColourMode
- catch_amalgamated.hpp, 345
- compare
- Catch::StringRef, 257
- Contains
- catch_amalgamated.hpp, 346
- convertIntoString
- catch_amalgamated.hpp, 346
- countedNext
- Catch::Generators::GeneratorUntypedBase, 116
- currentElementAsString
- Catch::Generators::GeneratorUntypedBase, 117
- DataBase< TSeq >, 91
- record_variant, 92
- reproductive_number, 93
- transition_probability, 93
- Default
- catch_amalgamated.hpp, 345
- defaultListListeners
- catch_amalgamated.hpp, 346
- defaultListReporters
- catch_amalgamated.hpp, 346
- defaultListTags
- catch_amalgamated.hpp, 347
- defaultListTests
- catch_amalgamated.hpp, 347
- engage
- Catch::ColourImpl::ColourGuard, 69
- Entity< TSeq >, 95
- findChild
- Catch::TestCaseTracking::ITracker, 150
- GENERATE
- catch_amalgamated.hpp, 332
- GENERATE_COPY
- catch_amalgamated.hpp, 332
- GENERATE_REF
- catch_amalgamated.hpp, 332
- GenerateFrom
- catch_amalgamated.hpp, 345
- guardColour
- Catch::ColourImpl, 70

- include/catch2/catch_amalgamated.hpp, 303
- INTERNAL_CATCH_BENCHMARK
 - catch_amalgamated.hpp, 332
- INTERNAL_CATCH_BENCHMARK_ADVANCED
 - catch_amalgamated.hpp, 333
- INTERNAL_CATCH_CAPTURE
 - catch_amalgamated.hpp, 333
- INTERNAL_CATCH_DECLARE_SIG_TEST1
 - catch_amalgamated.hpp, 333
- INTERNAL_CATCH_DECLARE_SIG_TEST_METHOD1
 - catch_amalgamated.hpp, 333
- INTERNAL_CATCH_DECLARE_SIG_TEST_METHOD_X
 - catch_amalgamated.hpp, 334
- INTERNAL_CATCH_DECLARE_SIG_TEST_X
 - catch_amalgamated.hpp, 334
- INTERNAL_CATCH_DEFINE_SIG_TEST1
 - catch_amalgamated.hpp, 334
- INTERNAL_CATCH_DEFINE_SIG_TEST_METHOD1
 - catch_amalgamated.hpp, 334
- INTERNAL_CATCH_DEFINE_SIG_TEST_METHOD_X
 - catch_amalgamated.hpp, 335
- INTERNAL_CATCH_DEFINE_SIG_TEST_X
 - catch_amalgamated.hpp, 335
- INTERNAL_CATCH_DYNAMIC_SECTION
 - catch_amalgamated.hpp, 335
- INTERNAL_CATCH_ELSE
 - catch_amalgamated.hpp, 335
- INTERNAL_CATCH_IF
 - catch_amalgamated.hpp, 336
- INTERNAL_CATCH_METHOD_AS_TEST_CASE
 - catch_amalgamated.hpp, 336
- INTERNAL_CATCH_MSG
 - catch_amalgamated.hpp, 336
- INTERNAL_CATCH_NO_THROW
 - catch_amalgamated.hpp, 336
- INTERNAL_CATCH_NTTP_1
 - catch_amalgamated.hpp, 337
- INTERNAL_CATCH_NTTP_REGISTER
 - catch_amalgamated.hpp, 337
- INTERNAL_CATCH_NTTP_REGISTER0
 - catch_amalgamated.hpp, 337
- INTERNAL_CATCH_NTTP_REGISTER_METHOD
 - catch_amalgamated.hpp, 338
- INTERNAL_CATCH_NTTP_REGISTER_METHOD0
 - catch_amalgamated.hpp, 338
- INTERNAL_CATCH_REGISTER_ENUM
 - catch_amalgamated.hpp, 338
- INTERNAL_CATCH_REGISTER_TESTCASE
 - catch_amalgamated.hpp, 338
- INTERNAL_CATCH_SECTION
 - catch_amalgamated.hpp, 339
- INTERNAL_CATCH_TEMPLATE_LIST_TEST_CASE_2
 - catch_amalgamated.hpp, 339
- INTERNAL_CATCH_TEMPLATE_LIST_TEST_CASE_METHOD_2
 - catch_amalgamated.hpp, 339
- INTERNAL_CATCH_TEMPLATE_TEST_CASE_2
 - catch_amalgamated.hpp, 340
- INTERNAL_CATCH_TEMPLATE_TEST_CASE_METHOD_2
 - catch_amalgamated.hpp, 341
- INTERNAL_CATCH_TEST
 - catch_amalgamated.hpp, 341
- INTERNAL_CATCH_TEST_CASE_METHOD2
 - catch_amalgamated.hpp, 342
- INTERNAL_CATCH_TESTCASE2
 - catch_amalgamated.hpp, 342
- INTERNAL_CATCH_THROWS
 - catch_amalgamated.hpp, 342
- INTERNAL_CATCH_THROWS_AS
 - catch_amalgamated.hpp, 343
- INTERNAL_CATCH_THROWS_MATCHES
 - catch_amalgamated.hpp, 343
- INTERNAL_CATCH_THROWS_STR_MATCHES
 - catch_amalgamated.hpp, 344
- INTERNAL_CATCH_TRANSLATE_EXCEPTION2
 - catch_amalgamated.hpp, 344
- INTERNAL_CHECK_THAT
 - catch_amalgamated.hpp, 344
- isConsole
 - Catch::IStream, 144
- isGeneratorTracker
 - Catch::TestCaseTracking::ITracker, 150
- isSectionTracker
 - Catch::TestCaseTracking::ITracker, 150
 - Catch::TestCaseTracking::SectionTracker, 233
- LFMCMC< TData >, 153
- listListeners
 - Catch::ReporterBase, 213
 - Catch::XmlReporter, 300
- listReporters
 - Catch::ReporterBase, 213
 - Catch::XmlReporter, 300
- listTags
 - Catch::ReporterBase, 214
 - Catch::XmlReporter, 300
- listTests
 - Catch::ReporterBase, 214
 - Catch::XmlReporter, 301
- LogicError
 - catch_amalgamated.hpp, 346
- m_stream
 - Catch::ReporterBase, 214
- makeStream
 - catch_amalgamated.hpp, 347
- Model< TSeq >, 175
 - add_global_action, 181
 - reset, 181
 - run_multiple, 182
 - write_data, 182
- next
 - Catch::Generators::ChunkGenerator< T >, 67
 - Catch::Generators::FilterGenerator< T, Predicate >, 111
 - Catch::Generators::FixedValuesGenerator< T >, 113

- Catch::Generators::Generators< T >, 115
- Catch::Generators::IteratorGenerator< T >, 147
- Catch::Generators::MapGenerator< T, U, Func >, 157
- Catch::Generators::RandomFloatingGenerator< Float >, 202
- Catch::Generators::RandomIntegerGenerator< Integer >, 204
- Catch::Generators::RangeGenerator< T >, 205
- Catch::Generators::RepeatGenerator< T >, 212
- Catch::Generators::SingleValueGenerator< T >, 237
- Catch::Generators::TakeGenerator< T >, 261
- NoAssertions
 - Catch::WarnAbout, 294
- None
 - catch_amalgamated.hpp, 345
- Ok
 - catch_amalgamated.hpp, 346
- operator&&
 - catch_amalgamated.hpp, 348
- operator|
 - catch_amalgamated.hpp, 348
- parseReporterSpec
 - catch_amalgamated.hpp, 348
- PersonTools< TSeq >, 197
- PlatformDefault
 - catch_amalgamated.hpp, 345
- Predicate
 - catch_amalgamated.hpp, 349
- Progress, 200
- Queue< TSeq >, 200
- RandGraph, 201
- read_edgelist
 - AdjList, 24
- record_variant
 - DataBase< TSeq >, 92
- registerReporterImpl
 - catch_amalgamated.hpp, 349
- reproductive_number
 - DataBase< TSeq >, 93
- reset
 - Model< TSeq >, 181
- ResultType
 - catch_amalgamated.hpp, 345
- run_multiple
 - Model< TSeq >, 182
- RuntimeError
 - catch_amalgamated.hpp, 346
- shouldRedirectStdOut
 - Catch::ReporterPreferences, 217
- shouldReportAllAssertions
 - Catch::ReporterPreferences, 217
- testRunEnded
 - Catch::CompactReporter, 73
 - Catch::ConsoleReporter, 81
 - Catch::CumulativeReporterBase, 90
 - Catch::EventListenerBase, 103
 - Catch::IEventListener, 127
 - Catch::MultiReporter, 185
 - Catch::StreamingReporterBase, 243
 - Catch::TAPReporter, 263
 - Catch::TeamCityReporter, 265
 - Catch::XmlReporter, 301
- testRunStarting
 - Catch::CompactReporter, 73
 - Catch::ConsoleReporter, 82
 - Catch::CumulativeReporterBase, 90
 - Catch::EventListenerBase, 103
 - Catch::IEventListener, 127
 - Catch::JUnitReporter, 152
 - Catch::MultiReporter, 185
 - Catch::SonarQubeReporter, 240
 - Catch::StreamingReporterBase, 244
 - Catch::TAPReporter, 263
 - Catch::TeamCityReporter, 265
 - Catch::XmlReporter, 301
- Tool< TSeq >, 275
- Tools< TSeq >, 276
- Tools_const< TSeq >, 277
- transition_probability
 - DataBase< TSeq >, 93
- ulpDistance
 - catch_amalgamated.hpp, 349
- UnmatchedTestSpec
 - Catch::WarnAbout, 294
- UserData
 - UserData< TSeq >, 287
- UserData< TSeq >, 285
 - UserData, 287
- vecHasher< T >, 287
- Virus< TSeq >, 290
- Viruses< TSeq >, 292
- Viruses_const< TSeq >, 292
- What
 - Catch::WarnAbout, 294
- Win32
 - catch_amalgamated.hpp, 345
- write_data
 - Model< TSeq >, 182
- writeAttribute
 - Catch::XmlWriter, 302