FS – Number Analyzer

Content

History

Version	Date	Adjustments
A	2006-10-10	First version. (MHATU)

1 Introduction

This document specifies the function of the Number Analyzer component. The Number Analyzer component is a rule based token parser that provides an interface used by clients in order to analyze numbers.

1.1 Notational Conventions

This document contains the following notational convention:

Underline is used to refer to terms defined in the glossary in chapter 1.2.

1.2 Glossary

1.2.1 Rules

The rules used for number analysis are defined as a two level tree structure, see Figure 1. The first level is called rule and the second level is called subrule. The rules can consist of one or more rules as defined in chapter 1.2.2.

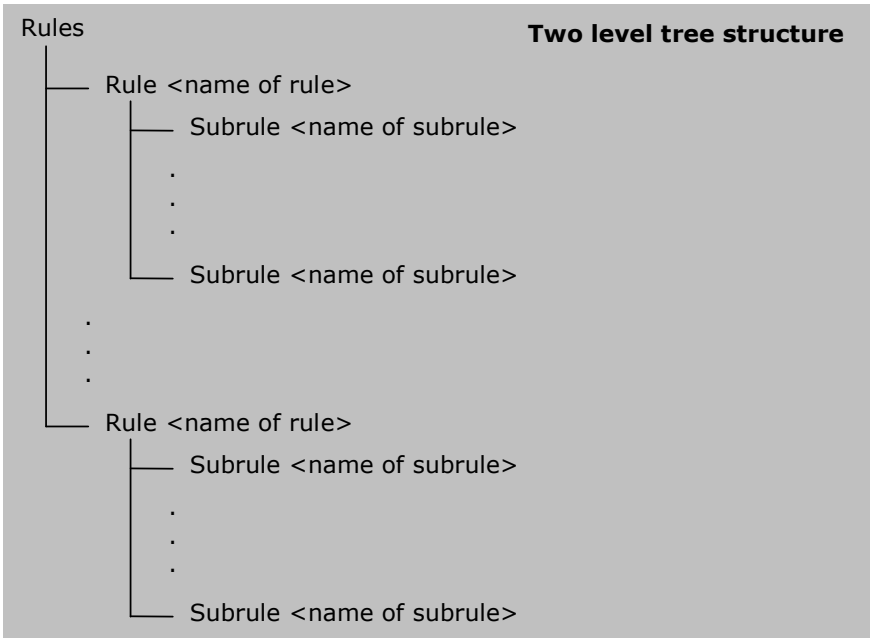

Figure 1 Rules is defined as a two level tree structure

The analyzer reads the rules from the configuration (see 4.1) and applies the rules on each analyzed token.

1.2.2 Rule

A rule is a set of subrules for a certain type of scenario, e.g. inbound call, subscriber outbound call, caller outbound call or inbound call for fax retrieval. Rules are usually defined to distinguish type of calls with different call fee.

A rule consists of one or more subrules as illustrated in Figure 2.

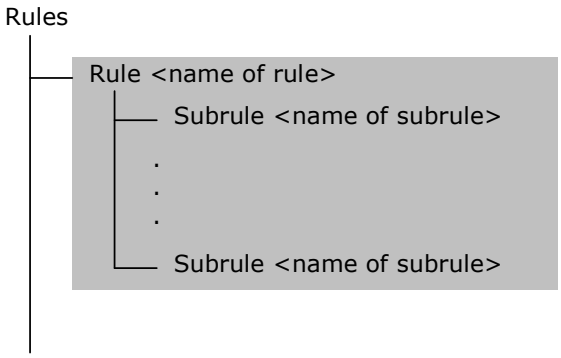

Figure 2 A rule consists of one or more subrules

1.2.3 Subrule

A subrule is a branch of a rule and is defined to match a specific number type in a dial plan. A subrule consists of an input pattern and a return value as illustrated in Figure 3.

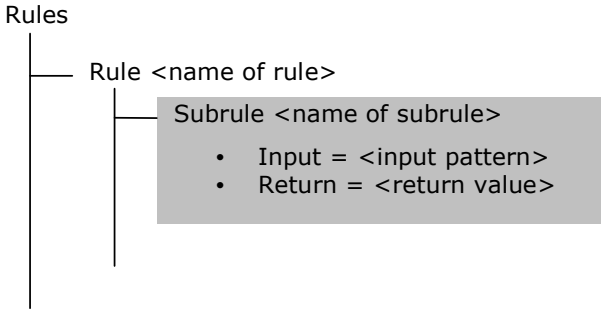

Figure 3 A subrule consists of an input pattern and a return value

The input pattern is a regular expression which is matched against the number to analyze. If the expression matches, this subrule applies for the number analysis.

If a rule consists of several subrules, the subrules are matched in the order they are defined, i.e. the first subrule has highest priority.

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The return value is an expression that specifies what should be returned as result after the number analysis. To be able to return parts of the analyzed number, the expression can use parameters defined in the input pattern.

1.2.4 Region Codes

A region code can either be a country code (CC) or an area code (AC) or both depending on if the region is a country or a part of a country.

2 Function Requirements (Commercial)

The following external requirements exist for this component:

- A tool for converting old number analysis rule files to the new format used by this component.

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3 Function Specification (Design Related)

3.1 Introduction

Figure 4 illustrates the Number Analyzer component.

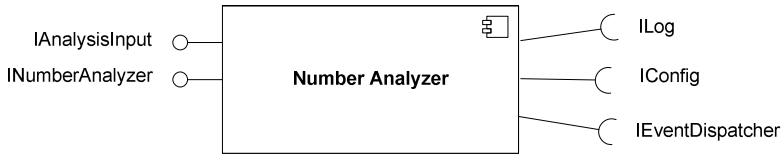

Figure 4 Number Analyzer component

3.2 Exported Interfaces

3.2.1 IAnalysisInput

This interface is used to create the input needed for number analysis, i.e. it is simply an input container to methods used in *INumberAnalyzer*, see 3.2.2.

3.2.1.1 Methods

IAnalysisInput offers the following methods:

- *void setRule(String ruleName)*
  Sets the name of the rule for number analysis. The Number Analyzer's configuration contains the available rules, see 4.1.
- *void setNumber(String number)*
  Sets the number that should be analyzed.
- *void setInformationContainingRegionCode(String information)*
  Adds information that might contain a region code that should be used for the analyzed number, see 3.4.1.1. This information field could for example be the ANI-number of a call.
- *String getRule()*
- *String getNumber()*

- *String getInformationContainingRegionCode()*

3.2.2 INumberAnalyzer

This interface is used by clients to analyze numbers.

3.2.2.1 Methods

INumberAnalyzer offers the following methods:

- *String analyzeNumber(IAnalysisInput input)*
  Performs number analysis based on the given input and returns the resulting number.

3.3 Imported Interfaces

The Number Analyzer uses the following external interfaces:

- *ILog* for logging
- *IConfig* for configuration
- *IEventDispatcher* for retrieving events of interest, see [2].

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3.4 Functions

3.4.1 Number Analysis

The number analysis must be very flexible so that all kind of numbers can be handled in a correct way. The rules in the Number Analyzer configuration should at least support the E.164 numbering plan (see [1]) with country code (CC) followed by the telephone number. The telephone number can further be divided into area code (AC) and local number (LN), see Figure 5.

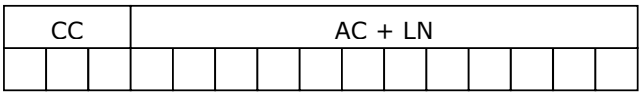

Figure 5 The ITU-T E.164 recommendation of number plan, 15 digits

The format of the telephone number depends on the national number plan since each country decides for itself what kind of numbering plan it has. This means that every country can decide what rules to follow when issuing telephone numbers. This includes things like the length of a telephone number, whether area code should be used or not.

The input to the number analysis consists of the following parts:

- Rule
- Number
- Information containing a region code

In order to analyze a number, a client must indicate which of the configured rules to use for the analysis. The number to analyze is of course also a part of the input. If a non-configured rule is used the Number Analyzer will throw an exception.

The number analysis results in a new number that is returned. In order to determine which region code to use in the resulting number, information containing a region code can be included in the input. How to interpret this region code information is described in 3.4.1.1.

3.4.1.1 Region Codes

Whether or not to include a region code in the analyzed number depends on the input to the number analysis. When extra information containing a region code is included in the input, this part of information is scanned after supported region codes. If a supported region code can be found in the information field, this region code is used for the analyzed number as well.

Which region codes that are supported are configurable for the Number Analyzer.

3.4.1.2 Number Length Control

For each configured rule, it is possible to define a maximum and minimum amount of digits allowed in the numbers to analyze. If a number is too long or too short, the *analyzeNumber* method will throw an exception containing the max and min values for the specific rule.

The number length control will only be performed if a max and/or min value is configured for the rule.

3.4.1.3 Blocking Numbers

It is possible to block numbers that shall not be possible to use. This can be done in the configuration per subrule. When a blocked number is analyzed, the *analyzeNumber* method will throw an exception.

3.4.1.4 Update Rules

The set of rules that are used for number analysis are configurable. The Number Analyzer updates the set of rules at reception of the event Re-load Configuration, see [2].

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3.4.1.5 Validation of Configured Rules

One part of the Number Analyzer is a tool for validation of rules in configuration. The test tool has a command line interface and is used to validate the regular expressions and rule design of the configuration file.

Erroneous configuration will be logged as a warning when the configuration is read, but not for each use of the rule. The use of such a rule will throw an exception.

3.4.2 Events

3.4.2.1 Consumed

The Number Analyzer registers itself (using IEventDispatcher, see [2]) as a receiver of the following events:

- Configuration has changed (indicates that configuration should be re-read)

3.4.2.2 Produced

The Number Analyzer does not produce any events.

3.4.3 Thread Safe

The Number Analyzer is thread safe.

4 External Operation Conditions

4.1 Configuration

The following are configurable in the Number Analyzer:

- Rules
- Region Codes that are supported

4.1.1 Rules Configuration

A rules configuration consists of the following:

- Maximum amount of digits in a number (optional)
- Minimum amount of digits in a number (optional)
- Subrules

4.1.2 Subrules Configuration

A subrule configuration consists of the following:

- Input pattern
- Return expression
- Information of blocked numbers (optional). It is possible to configure both number intervals and a list of individual numbers that are blocked.

4.2 Logging

- Invalid configuration parameters are logged as warning together with relevant default values.

<<TBD: Add description on when Number Analyzer shall use informational logging>>

5 Capabilities

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6 References

[1] ITU-T Recommendation E.164
Assigned Country Codes

[2] FS Execution Engine
3/FS-MAS0001 Uen

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7 Terminology

AC	Area code
CC	Country code
LN	Local number