Claims

1. A communications server apparatus for processing a service provision request for a service, the communications server apparatus comprising a processor, a memory and a formula database configured to contain a set of string-based arithmetic expressions, each expression defining a price calculation to be applied to a service provision request, and being configured, under control of the processor, to execute instructions stored in the memory to:

receive data representative of a specified service provision request including data representative of one or more parameters associated therewith, wherein a price for said specified service provision is at least partially dependent on the values of said one or more parameters; and, in response to receipt of said data representative of said specified service provision request:

identify a price calculation to be performed for the service provision request, the price calculation associated with a given one of the set of string-based arithmetic expressions;

obtain an abstract syntax tree, AST, corresponding to the given string-based arithmetic expression, the AST having been generated from the given string-based arithmetic expression by parsing the expression;

populate a Symbol Table with values for said one or more parameters associated with said specified service provision request; and

calculate a price for said specified service provision request using said AST and the values in said Symbol Table.

2. A communications server apparatus according to claim 1, configured, when obtaining the AST, to:

determine if an AST representative of the given string-based arithmetic expression is saved in a cache associated with said communications server apparatus, and, if so, retrieve said AST from said cache; if not:

retrieve the given string-based arithmetic expression from said formula database;

parse the given string-based arithmetic expression to create an AST corresponding to the expression; and

save said AST to said cache.

3. A communications server apparatus according to claim 2, configured to invalidate cache data storing an AST representation for a particular string-based arithmetic expression in the cache in response to a change to the particular string-based arithmetic expression in the formula database.

4. A communications server apparatus according to claim 1, configured to parse the given string-based arithmetic expression, generate the AST from the string-based arithmetic expression and store the AST in ~~the~~ a cache prior to receiving the service provision request and/or in response to addition or modification of the string-based arithmetic expression in the formula database.

5. A communications server apparatus according to any of the preceding claims, further configured to traverse said AST and perform any calls to external APIs referenced therein and to populate the Symbol Table with values obtained from said external APIs.

6. A communications server apparatus according to claim 5, further configured to store said values obtained from said external APIs in ~~said~~ a cache.

7. A communications server apparatus according to any of the preceding claims, comprising a user interface configured to allow a user to enter new string-based arithmetic expressions and/or modify existing string-based arithmetic expressions, and to save new and/or modified arithmetic expressions to said formula database.

8. A communications server apparatus according to claim 7, wherein said user interface is configured to allow a user to create a new arithmetic expression using one or more pre-existing arithmetic expressions saved in said formula database as one or more respective operands of the new arithmetic expression, and save said new arithmetic expression to said formula database.

9. A communications server apparatus according to any of the preceding claims, wherein at least some of the string-based arithmetic expressions include at least one constant parameter having a predetermined value, and the communications server apparatus being further configured to determine if any constant parameter values in the given arithmetic expression are saved in ~~the~~ a cache and, if so, retrieve said constant parameter values from said cache and incorporate them into said Symbol Table.

10. A communications server apparatus according to claim 9, further configured to, if said constant parameter values are not stored in said cache, retrieve said constant parameter values from a database associated with said communications server apparatus, incorporate them into said Symbol Table, and update said cache with said constant parameter values.

11. A communications server apparatus according to any of the preceding claims, configured to store a plurality of sets of constant parameter values in a database, to select a given one of the sets of constant parameter values based on the service request and/or the given string-based arithmetic expression, and to obtain one or more values of constant parameters referenced in the given string-based arithmetic expression from the selected set and incorporate the values into the Symbol Table for use in processing the AST for the service request.

12. A communications server apparatus according to claim 11, wherein the database is configured to store an association between the string-based arithmetic expression and one or more of the plurality of sets of constant parameter value~~s sets~~, the apparatus configured to select the given one of the sets of constant parameter value~~s set~~ based on the stored association.

13. A communications server apparatus according to claim 11 or 12, configured to store each constant parameter value set as a document, associate a schema descriptor with each document encoding a schema of the document, and use the schema descriptor for a given document to perform at least one of: validating one or more changes to the document, validating a string-based arithmetic expression associated with the document

for type correctness; and validating an association between a string-based arithmetic expression and the document.

14. A communications server apparatus according to any of the preceding claims, wherein the symbol table is arranged to map one or more symbols referenced in the string-based expression and/or AST to values associated with the symbols, the apparatus configured, when performing the price calculation, to traverse the AST, lookup values for symbols referenced in the AST in the symbol table and use the values to perform the calculation defined by the AST.

15. A communications server apparatus according to any of the preceding claims, wherein said string-based arithmetic expressions are written in a domain language specified using a context-free grammar.

16. A communications server apparatus according to claim 15, wherein said string-based arithmetic expressions are written in a domain language specified using an Extended Backus-Naur Form, EBNF, grammar.

17. A communications server according to any of the preceding claims, further comprising a parser generator for generating a parser for parsing said identified arithmetic expression to create a parse tree, the apparatus configured to create the AST from said parse tree.

18. A method, performed in a service provider apparatus, for processing a service provision request for a service, the service provider apparatus comprising a formula database containing a set of string-based arithmetic expressions, each expression defining a price calculation to be applied to a service provision request, the method comprising:

receiving data representative of a specified service provision request including data representative of one or more parameters associated therewith, wherein a price for said specified service provision is at least partially dependent on the values of said one or more parameters; and, in response to receipt of said data representative of said specified service provision request:

identifying a price calculation to be performed for the service provision request, the price calculation associated with a given one of the set of string-based arithmetic expressions;

obtaining an abstract syntax tree, AST, corresponding to the given string-based arithmetic expression, the AST having been generated from the given string-based arithmetic expression by parsing the expression;

populating a Symbol Table with values for said one or more parameters associated with said specified service provision request; and

calculating a price for said specified service provision request using said AST and the values in said Symbol Table.

19. A computer program product comprising instructions for implementing the method of claim 18.

20. A computer program comprising instructions for implementing the method of claim 18.

21. A non-transitory storage medium storing instructions which, when executed by a processor, cause the processor to perform the method of claim 18.