Title: IDENTIFICATION REGISTRATION SYSTEM

Abstract: A system for and method of registering uniquely identified entities, the method comprising the steps of: registering identifier types (4); registering identifiers (5); registering entity types (6); registering entities (7); registering identifications (8); registering a number of rules (10); registering signalling tables (9), wherein each signalling table is coupled to one of the rules as specified before, the table providing information with respect to the identifiers and/or identifier types and/or entities and/or entity types and/or identifications that does not satisfy the rule linked to the table; and checking (11) the degree to which the registrations of identifiers, identifier types, entities, entity types and identifications satisfy the rules.
Identification registration system

The present invention relates to an identification registration system. More in particular, the present invention relates to a method and system for registering and/or checking identifiers, such as names, email addresses, and identity numbers.

Identifiers are used to identify people, objects and ideas (in general: entities). For an identifier to be effective it has to be unique, at least in its context. However, identifiers that may be unique in one (small) context prove to be so no longer in another (larger) context.

For example, in his own family the identifier "John" is sufficient to indicate the person in question. When another "John" lives in the same street, then "John" is ambiguous in the context of the street, i.e. we no longer know who "John" refers to since several persons have the same name. An identifier that works well in a small context no longer works in a larger context and must be replaced by an identifier which contains additional information, such as a last name, for example. If we want to look up "John" in the telephone directory (an even larger context), then "John Smith" is no longer an effective identifier and we must also provide the street, house number and city.

The additional information that is necessary to uniquely identify someone or something (in other words, an entity) in a given context differs according to the context. For the telephone directory this is the street, house number and city. Within the context of John's work this would be his employee number. Within the context of his insurance this would be his customer number, while for tax purposes this would be his National Insurance number.

Within large contexts that are divided up into several small contexts it is inefficient to have to look up what context-dependent information must be provided every time a certain entity is referred to. When a person from n contexts has to be looked for in m other contexts, then n x m translations of an identifier are available.

If the context becomes even larger (and therefore covers several smaller contexts, which in turn may themselves cover several even smaller contexts, etc.) it is increasingly difficult to determine which types of identifiers are necessary within such a broad context and which translations of these identifiers are necessary so that
the desired effect is guaranteed, i.e. that each (translated) identifier unequivocally
denotes an entity and is thus not ambiguous.

In particular in the field of software engineering a proper definition and use
of identifiers are important. When software designers make errors the consequences
can be serious. Identifier errors are typically manifested late in the development of a
program so that corrections take longer and are more invasive than when the errors
are brought to light in the planning phase. Since this type of problem occurs, above
all, in large contexts, the chance exists that the errors will only appear when the
program or system is already operational, making the corrections even more costly.

The Prior Art does not provide satisfactory mechanisms for checking the
uniqueness of identifiers. British Patent Application GB 2 379 296, for example,
discloses a data storage system which has an active data store and a data
communication mechanism. A unified container layer validates both externally-
generated data and data generated within the active data store. The active data store
is an entity-relationship-attribute data store which comprises a relational database.
The unified container layer may validate data using a syntax checker and a semantics
checker, which may comprise a rules engine. Preferably, the data communication
mechanism is one of a publish/subscribe system, a synchronous communication
system, and an asynchronous communication system. However, the disclosure of
said British Patent Application is generic and does not provide an efficient and
economical mechanism for checking identifiers.

It is an object of the present invention to overcome these and other problems
of the Prior Art and to provide an improved method and system for checking and/or
registering identifiers.

Accordingly, the present invention provides a method of registering uniquely
identified entities, the method comprising the steps of:
- registering identifier types;
- registering identifiers;
- registering entity types;
- registering entities, while specifying of each entity E in the registered entities
  of which entity types the particular identity E is an instance;
- registering identifications, wherein each identification is a specification of one identifier ID and one entity E, and wherein the specification implies that ID identifies E;
- registering a number of rules, each of which concerns identifiers and/or identifier types and/or entities and/or entity types and/or identifications such as those that are registered in the particular registrations, and of which it can be established whether the identifiers and/or identifier types and/or entities and/or entity types and/or identifications such as are registered in said registrations satisfy the rule;
- registering signalling tables, wherein each signalling table is coupled to one of the rules as specified before, the table providing information with respect to the identifiers and/or identifier types and/or entities and/or entity types and/or identifications that does not satisfy the rule linked to the table; and
- checking the degree to which the registrations of identifiers, identifier types, entities, entity types and identifications satisfy the rules.

By registering identifier types, identifiers, entity types, entities, identifications and a number of rules, a suitable framework for checking the uniqueness and/or other characteristics of the identifiers is provided. By registering signalling tables as specified above, deviations from the rules can be recorded systematically. Finally, by checking the degree to which the registrations satisfy the rules, a suitable checking mechanism is provided. The features of the present invention provide a synergy in that they provide an economical yet effective mechanism for checking identifiers, in particular for checking the uniqueness of identifiers.

The above set of features of the present invention is economical in that it allows the checking of identifiers without requiring unnecessary processing time or effort. Accordingly, the present invention provides the technical advantage of providing an efficient computer (or processor) use while providing an excellent checking of the uniqueness of identifiers.

The registration may be either a distributed registration, for example at different terminals and/or locations, or a central registration, or a combination of a distributed and central registration.
It is preferred that the step of checking comprises the further step of storing, for each rule, information on found rule violations, preferably in a signalling table associated with the rule.

Each identifier type may advantageously comprise:

(a) an identifier type name that is unique within said registration of identifier types,
(b) a context name,
(c) a symbol type being a procedure which, when implemented on a row of bits, determines whether said bit row of bits can or cannot be a symbol for identifiers of the identifier type, and
(d) an entity type name.

It is further preferred that each identifier:

(e) consists of a symbol which can be represented by a row of bits, and/or
(f) is an instance of an identifier type from the registration of identifier types.

This ensures a practical implementation of the identifiers.

The rules used in the present invention advantageously comprise at least one of the following:

- each identifier identifies at most one entity;
- each identifier identifies at least one entity;
- each identifier is associated with precisely one identifier type;
- each identifier is associated with precisely one symbol;
- each identifier is uniquely characterized by (i) its identifier type, which is uniquely characterized by its search key type and its search environment, and (ii) its identifier symbol which is equal to the name of the entity to which the identifier refers;
- each identifier type is associated with precisely one context;
- each identifier type is associated with precisely one symbol type;
- each symbol type is associated with precisely one identifier type;
- each identifier type is uniquely characterized by its context and its symbol type;
- for each identifier its symbol must agree with the symbol type linked to the same identifier.
Alternative or additional rules are the following:
- for interpreting a symbol the following are required: (i) the context in which the symbol has to be interpreted, (ii) the symbol type that must be used in the context, and (iii) the symbol itself;
- for interpreting symbols as an identifier, the identifier type it must be interpreted as must be known, which identifier type must be an existing combination of context and symbol type;
- to interpret symbols as an identifier, the name as well as the identifier type must be known;
- when an entity is found, then this is the entity that is identified by the identifier constructed from the symbol;
- each identifier type is associated with precisely one entity class;
- each entity is associated with precisely one entity class;
- each identifier referring to an entity may only do that when the identifier type is associated with the entities class.

In some embodiments a selection of the above rules is made, while in other embodiments all the above rules are used.

In the method according to the present invention the registrations of identifier types, identifiers, entities and entity types and identifications are preferably introduced by means of data interfaces set up for that purpose, and more preferably each time an element is added to, altered or removed from one of these registrations, the signalling tables are computed by applying the rules to the populations of the registrations and filling each signalling table with data on the parts of the population that do not satisfy the rule with which the signalling table is associated.

The present invention also provides a computer program product for carrying out the method as defined above. A computer program product may comprise a set of computer executable instructions stored on a data carrier, such as a CD or a DVD. The set of computer executable instructions, which allow a programmable computer to carry out the method as defined above, may also be available for downloading from a remote server, for example via the Internet.

The present invention additionally provides a system for registering uniquely identified entities, the system comprising:
a first storage medium for registering identifier types;
- a second storage medium for registering identifiers;
- a third storage medium for registering entity types;
- a fourth storage medium for registering entities, while specifying of each entity E in the registered entities of which entity types the particular identity E is an instance;
- a fifth storage medium for registering identifications, wherein each identification is a specification of one identifier ID and one entity E, and wherein the specification implies that ID identifies E;
- a sixth storage medium for registering a number of rules, each of which concerns identifiers and/or identifier types and/or entities and/or entity types and/or identifications such as those that are registered in the particular registrations, and of which it can be established whether the identifiers and/or identifier types and/or entities and/or entity types and/or identifications such as are registered in said registrations satisfy the rule;
- a seventh storage medium for registering signalling tables, wherein each signalling table is coupled to one of the rules as specified before, the table providing information with respect to the identifiers and/or identifier types and/or entities and/or entity types and/or identifications that does not satisfy the rule linked to the table; and
- a control device for checking the degree to which the registrations of identifiers, identifier types, entities, entity types and identifications satisfy the rules.

The system of the present invention has the same advantages as the method defined above.

The system of the present invention may further comprise at least one data interface for filling, viewing, modifying and/or removing elements of said registration. The data interface may be a graphic user interface (GUI). Alternatively, or additionally, the data face may be a link to operational systems which allow introducing newly issued names or removing old names.

Advantageously, the system according to the present invention may further comprise a signalling interface for querying and/or viewing the signalling tables. The
signalling interface may be a graphic user interface (GUI) which allows viewing the signalling and/or generating reports. Alternatively, or additionally, the signalling interface may be a link to at least one operational system which allows to determine whether newly issued names can violate rules.

The present invention will further be explained below with reference to exemplary embodiments illustrated in the accompanying drawings, in which:

Fig. 1 schematically shows a system according to the present invention.

The inventive system shown merely by way of non-limiting example in Fig. 1 comprises a signalling interface 1, a first data interface 2 and a second data interface 3; also storage media for the registration of identifier types 4, identifiers 5, entity types 6, entities 7 and identifications 8, and further storage media for signalling tables 9 and rules 10. The functioning of the different units is controlled and coordinated by a control device 11, which also arranged for carrying out checks. The system configuration shown in Figure 1 is connected to a terminal 12 and a server 13 via the interfaces 1, 2 and 3.

In the system of Fig. 1, the method according to the invention may be carried out as follows. Assume a retailer R1 of an Internet business IB wants to give the email address 'smith@ib.com' to Mr. Smith (who has just become a customer of R1), and further assume that IB has a system according to the invention. Retailer R1 makes an email box Eb for Mr. Smith and then sends a report (either directly via terminal 12, or via the ordering system of R1 that is running on server 13) to control device 11, with the question of whether the identifier IdI consisting of the symbol 'smith@ib.com' being of the type 'email address', can be issued and associated with (that is, linked to) email box Eb. Control device 11 then makes a return point (that is, backup) point, i.e. takes all measures necessary to be able to restore the status of the database as it is at that moment (it is noted that this is a standard feature of modern databases). Then control device 11 adds an identification E1 to storage medium 8, consisting of the pair (IdI, Eb).
Subsequently, the control device 11 checks whether there are rules in the storage medium 10 that have been violated. The storage media 3 to 8 inclusive are also consulted for checking the rules. In the event that no rule infringements have been found, control device 11 accepts the modification in storage medium 8 and sends a report to R1 that 'smith@ib.com' is a registered symbol of the email box type and is linked to Eb. In the event that one or more rules infringements are found, then depending on the implementation by control device 11:

1) the restoration (backup) point can be used to restore all databases to their initial position, or

2) a signalling (s, (Id2, Eb)) can be included in storage medium 9 with which it is reported that identification (Id1, Eb) does not satisfy the rules.

In both cases a report is sent to R1 stating that the request cannot be acceded to, at the same time reporting which rule would be violated by so doing.

The present invention is based upon the insight that a set of rules may be applied to identifiers and related items to determine whether the identifier is unique within its context.

The present invention may, for example, be used in the fields of software design, software testing and debugging, database management, and various other fields. The system of the present invention may be arranged for producing email addresses, issuing telephone numbers, issuing customer numbers, issuing parts or item numbers, and similar applications. In the field of software design mentioned above, the present invention can improve the functioning of the computer by producing unique identifiers in software programs, and allocating unique addresses to variables. It will be clear that in such applications the present invention influences the operation of the computer.

It is noted that any terms used in this document should not be construed so as to limit the scope of the present invention. In particular, the words "comprise(s)" and "comprising" are not meant to exclude any elements not specifically stated. Single elements may be substituted with multiple elements or with their equivalents.

Method steps presented in a certain order may preferably, but not necessarily, be carried out in the stated order while it should be understood that alternative orders of the method steps may also be possible.
It will therefore be understood by those skilled in the art that the present invention is not limited to the embodiments illustrated above and that many modifications and additions may be made without departing from the scope of the invention as defined in the appending claims.
Claims

1. A method of registering uniquely identified entities, the method comprising the steps of:

- registering identifier types (4);
- registering identifiers (5);
- registering entity types (6);
- registering entities (7), while specifying of each entity E in the registered entities of which entity types the particular identity E is an instance;
- registering identifications (8), wherein each identification is a specification of one identifier ID and one entity E, and wherein the specification implies that ID identifies E;
- registering a number of rules (10), each of which concerns identifiers and/or identifier types and/or entities and/or entity types and/or identifications such as those that are registered in the particular registrations, and of which it can be established whether the identifiers and/or identifier types and/or entities and/or entity types and/or identifications such as are registered in said registrations satisfy the rule;
- registering signalling tables (9), wherein each signalling table is coupled to one of the rules as specified before, the table providing information with respect to the identifiers and/or identifier types and/or entities and/or entity types and/or identifications that does not satisfy the rule linked to the table; and
- checking (11) the degree to which the registrations of identifiers, identifier types, entities, entity types and identifications satisfy the rules.

2. The method according to claim 1, wherein the registration is a distributed registration.

3. The method according to claim 1, wherein the registration is a central registration.
4. The method according to claim 1, 2 or 3, wherein the step of checking comprises the further step of storing, for each rule, information on found rule violations, preferably in a signalling table associated with the rule.

5. The method according to any of the preceding claims, in which each identifier type comprises:
   (a) an identifier type name that is unique within said registration of identifier types,
   (b) a context name,
   (c) a symbol type being a procedure which, when implemented on a row of bits, determines whether said bit row of bits can or cannot be a symbol for identifiers of the identifier type, and
   (d) an entity type name.

6. The method according to any of the preceding claims, wherein each identifier:
   (e) consists of a symbol which can be represented by a row of bits, and
   (f) is an instance of an identifier type from the registration of identifier types.

7. The method according to any of the preceding claims, wherein the rules comprise at least one of the following rules:
   - each identifier identifies at most one entity;
   - each identifier identifies at least one entity;
   - each identifier is associated with precisely one identifier type;
   - each identifier is associated with precisely one symbol;
   - each identifier is uniquely characterized by (i) its identifier type, which is uniquely characterized by its search key type and its search environment, and (ii) its identifier symbol which is equal to the name of the entity to which the identifier refers;
   - each identifier type is associated with precisely one context;
   - each identifier type is associated with precisely one symbol type;
   - each symbol type is associated with precisely one identifier type;
- each identifier type is uniquely characterized by its context and its symbol type;
- for each identifier its symbol must agree with the symbol type linked to the same identifier.

8. The method according to any of the preceding claims, wherein the rules comprise at least one of the following rules:
- for interpreting a symbol the following are required: (i) the context in which the symbol has to be interpreted, (ii) the symbol type that must be used in the context, and (iii) the symbol itself;
- for interpreting symbols as an identifier, the identifier type it must be interpreted as must be known, which identifier type must be an existing combination of context and symbol type;
- to interpret symbols as an identifier, the name as well as the identifier type must be known;
- when an entity is found, then this is the entity that is identified by the identifier constructed from the symbol;
- each identifier type is associated with precisely one entity class;
- each entity is associated with precisely one entity class;
- each identifier referring to an entity may only do that when the identifier type is associated with the entities class.

9. The method according to any of the preceding claims, wherein the registrations of identifier types, identifiers, entities and entity types and identifications are introduced by means of data interfaces set up for that purpose, and preferably each time an element is added to, altered or removed from one of these registrations, the signalling tables are computed by applying the rules to the populations of the registrations and filling each signalling table with data on the parts of the population that do not satisfy the rule with which the signalling table is associated.
10. A computer program product for carrying out the method according to any of claims 1-9.

11. A system for registering uniquely identified entities, the system comprising:

- a first storage medium (4) for registering identifier types;
- a second storage medium (5) for registering identifiers;
- a third storage medium (6) for registering entity types;
- a fourth storage medium (7) for registering entities, while specifying of each entity E in the registered entities of which entity types the particular identity E is an instance;
- a fifth storage medium (8) for registering identifications, wherein each identification is a specification of one identifier ID and one entity E, and wherein the specification implies that ID identifies E;
- a sixth storage medium (10) for registering a number of rules, each of which concerns identifiers and/or identifier types and/or entities and/or entity types and/or identifications such as those that are registered in the particular registrations, and of which it can be established whether the identifiers and/or identifier types and/or entities and/or entity types and/or identifications such as are registered in said registrations satisfy the rule;
- a seventh storage medium (9) for registering signalling tables, wherein each signalling table is coupled to one of the rules as specified before, the table providing information with respect to the identifiers and/or identifier types and/or entities and/or entity types and/or identifications that does not satisfy the rule linked to the table; and
- a control device (11) for checking the degree to which the registrations of identifiers, identifier types, entities, entity types and identifications satisfy the rules.

12. The system according to claim 11, further comprising at least one data interface (2, 3) for filling, viewing, modifying and/or removing elements of said registration.
13. The system according to claim 12, wherein the data interface (2, 3) is a
graphic user interface and/or a link to operational systems which allow introducing
newly issued names or removing old names.

14. The system according to any of claims 11-13, further comprising a signalling
interface (1) for querying and/or viewing the signalling tables.

15. The system according to claim 14, wherein the signalling interface (1) is a
graphic user interface which allows viewing the signalling and/or generating reports,
and/or which is a link to at least one operational system which allows to determine
whether newly issued names can violate rules.
INTERNATIONAL SEARCH REPORT

International application No
PCT/NL2007/050690

A. CLASSIFICATION OF SUBJECT MATTER
INV. G06F17/30

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED
Minimum documentation searched (classification system followed by classification symbols)
G06F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

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<td>GB 2 379 296 A (IBM [US]) 5 March 2003 (2003-03-05) page 8, line 3 - page 9, line 12; figures 1,2</td>
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