

Preliminary Notice

Thank you for your interest in this white paper. This paper is freely downloadable (PDF) from www.conceptualheaven.com.

To appreciate its contents, you need to be aware of the purpose and the main principles of the "Semantics for Business Vocabulary and Rules" specification (SBVR) published by the Object Management Group (OMG) and freely downloadable (PDF) from www.omg.org/spec/SBVR/ at the time of writing. That information is available as part of that specification, notably in Clause 1 and Annex A.

This paper contains an example of how you can present a business model on the basis of the SBVR specification, and more specifically, this is also an example of use of the "Conceptual Heaven for SBVR" meta-model. That meta-model is specified in the documents "Conceptual Heaven Vocabulary Documents" and "Conceptual Heaven Concept Diagrams". These two documents complement each other. Both are freely downloadable (PDF) from www.conceptualheaven.com.

More information about the purpose and content of this document and its relations to other materials can be found in the Introduction section and in Clause 1.

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Introduction to Conceptual Heaven EU-Rent Example

To locate the materials discussed in the following paragraphs, please refer to "Related documents" at the end of this section.

What is "Conceptual Heaven EU-Rent Example" ?

"Conceptual Heaven EU-Rent Example" is an example of a conceptual schema based on the Semantics of Business Vocabulary and Rules (SBVR) specification by the Object Management Group (OMG). More specifically, it is an example of a schema based on the "Conceptual Heaven Vocabulary Documents" meta-model.

In addition, it is an example of the "SBVR-style" presentation format recommended in (non-normative) Annexes of the OMG specification and used by OMG for the presentation of SBVR itself.

Is this document for you ?

This document is for you if you are applying (or if you are interested in applying) SBVR for your own purposes and you are looking for examples to compare your own specifications with, or to use as a starting point.

This document also serves as a sample model for those using the "Conceptual Heaven Vocabulary Documents" meta-model.

Purpose

The purpose of the sample model in this document, together with the "Conceptual Heaven for SBVR" meta-model that it is based on, is to promote the use of SBVR by making the specification more accessible and appealing to practitioners. To achieve this goal, it attempts to *illustrate by example* :

- The document format that Conceptual Heaven advocates for "SBVR-style" specifications.
- The dialect of SBVR Structured English that Conceptual Heaven advocates for use in such documents.
- The diagramming technique that Conceptual Heaven uses in such documents to visualize the existence of concepts and the relationships between them.

The document format and the dialect are formally presented in the "Conceptual Heaven Vocabulary Documents" schema.

The diagramming technique is formally presented in the "Conceptual Heaven Concept Diagrams" schema.

Relation to SBVR

The sample model in this document is an instance of the "Conceptual Heaven Vocabulary Documents" meta-model. That meta-model, in turn, is a variation on the SBVR specification itself. For more details on the resemblances and differences between the two, please read "Relation to SBVR" in the Introduction to the meta-model.

The OMG specification contains a (non-normative) EU-Rent example in Annex E, that shows what a model based on the SBVR meta-model looks like. Annex E and this document share the same example subject, namely a fictitious international car rental company named EU-Rent, that has been something of a classic in the business rule community for many years. The sample in this document is freely inspired by Annex E. Many details have been omitted (Annex E is much larger) or completely changed. Others do not appear in Annex E. Resemblance to Annex E, or the lack thereof, is not systematically identified.

Version information

Conceptual Heaven 1.0

This version 1.0 corresponds to version 1.0 of the "Conceptual Heaven Vocabulary Documents" schema and version 1.0 of the "Conceptual Heaven Concept Diagrams" schema.

SBVR 1.0 and 1.1

Version 1.0 of the Conceptual Heaven schemas is for version 1.1 of the SBVR specification as published by OMG. A final version of SBVR 1.1 became available to the general public in May 2013. This version is labeled "SBVR 1.1 Beta 2". An official non-Beta document is expected to be published in July 2013, but this version is not expected to contain any changes at the content level. SBVR 1.1 does not include major modifications relative to 1.0, although some key terminology was revised. Of particular importance to the Conceptual Heaven models is the 1.1 decision to use 'verb concept' as the primary term for what was usually called 'fact type' in SBVR 1.0 (where 'verb concept' was just a less-often-used synonym of 'fact type'), reserving 'fact type' as a more technical term for the area of logical formalization covered by Clause 10. This decision has an effect on neighboring terms with "verb". For example, 1.1 introduces "verb concept role" to clearly distinguish roles that are not situational roles.

Conceptual Heaven endorses these key terminology changes in its 1.0 schemas.

Related documents

1. "Semantics of Business Vocabulary and Rules" (SBVR), v. 1.0, formal OMG specification, freely downloadable from <http://www.omg.org/spec/SBVR/1.0/>.
2. "Semantics of Business Vocabulary and Rules" (SBVR), v. 1.1 Beta 2, OMG specification, freely downloadable from <http://www.omg.org/spec/SBVR/1.1/>.
3. "Conceptual Heaven Vocabulary Documents v. 1.0", freely downloadable from www.conceptualheaven.com.
4. "Conceptual Heaven Concept Diagrams v. 1.0", freely downloadable from www.conceptualheaven.com.

More Conceptual Heaven

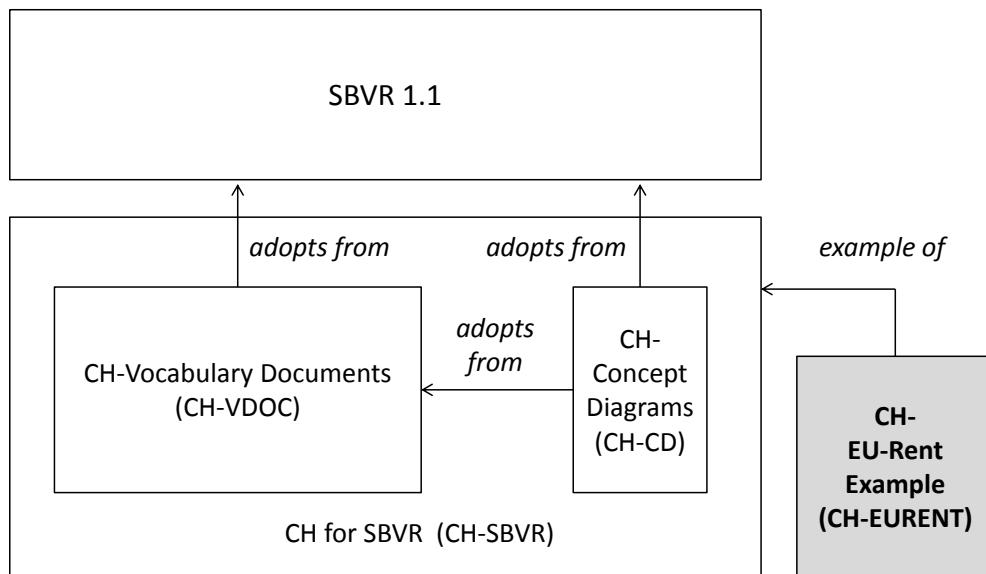
If you use MS Word 2010 to draw up glossaries and rulebooks in the presentation format used in this document, Conceptual Heaven proposes freely downloadable tools that allow you to convert such specifications into:

- Alphabetical lists of terms and definitions in tabular presentation.

- Validation reports that give information about integrity of your glossaries and rulebooks.
- XML documents that allow you to exchange the information with tools, services and databases.

A Word template that gives you a jump-start in this area is also offered for free. In addition to click-and-use these tools, you can also join Conceptual Heaven's online community by simple and free registration. This allows you to download the XSLT Framework that the tools are based on so you can customize for yourself. Finally, you can also contribute actively by extending Conceptual Heaven's tool offerings.

1. Vocabulary registration



1.1. Subject vocabulary

Conceptual Heaven EU-Rent Example 1.0

Definition: Version 1.0 of an example conceptual schema of a fictitious car rental company published by [Conceptual Heaven](#) and known as "Conceptual Heaven EU-Rent Example".

Note: The [subject vocabulary described in this vocabulary document](#).

Note: This vocabulary specifies the [terminology namespace](#) of this [vocabulary document's subject vocabulary](#).

Note: This document offers an example of the document format and diagram format specified in [CH-SBVR 1.0](#).

Synonym: [CH-EURENT 1.0](#)

Namespace URI: <http://www.conceptualheaven.com/spec/eu-rent10>

1.2. Other vocabularies

Car Rental Industry Standard Glossary 2.3

Definition: A fictitious version 2.3 of a fictitious [SBVR 1.1:] vocabulary defined in English by the Car Rental Industry.

Synonym: CRISG 2.3

Namespace URI: <http://www.crisg.org/23>

Conceptual Heaven Concept Diagrams 1.0

Definition: Version 1.0 of the specification of a diagramming technique applied in vocabulary documents published by Conceptual Heaven and known as "Conceptual Heaven Concept Diagrams".

Synonym: CH-CD 1.0

Conceptual Heaven for SBVR 1.0

Definition: The combination of: Conceptual Heaven Metamodel 1.0, Conceptual Heaven Vocabulary Documents 1.0, and Conceptual Heaven Concept Diagrams 1.0.

Note: The vocabulary that the vocabulary presented in this document is an example of.

Synonym: CH-SBVR 1.0

Namespace URI: <http://www.conceptualheaven.com/spec/ch-vdoc10>

Conceptual Heaven Vocabulary Documents 1.0

Definition: Version 1.0 of the specification of an "SBVR-style" document format applied in vocabulary documents published by Conceptual Heaven and known as "Conceptual Heaven Vocabulary Documents".

Synonym: CH-VDOC 1.0

Namespace URI: <http://www.conceptualheaven.com/spec/ch-vdoc10>

Longman Dictionary of Contemporary English

Definition: The publication ""Longman Dictionary of Contemporary English", © Longman Group Ltd 1978, Harlow, UK, Reprinted with corrections 1981, ISBN 0 582 52571 3.

Synonym: LDCE

Note: The vocabulary serving in this document as the common-language vocabulary.

Semantics of Business Vocabulary and Rules 1.1

Definition: Version 1.1 of the formal specification published by OMG known as the "Semantics for Business Vocabulary and Rules" (SBVR).

Synonym: [SBVR 1.1](#)

Namespace URI: <http://www.omg.org/spec/SBVR/20070901/SBVR.xml>

Semantics of Business Vocabulary and Rules 1.1, Annexes C-D-E

Definition: Non-normative annexes C, D and E of version 1.1 of the formal specification published by OMG known as the "Semantics for Business Vocabulary and Rules" (SBVR).

Synonym: [SBVR-Ann 1.1](#)

Namespace URI: <http://www.omg.org/spec/SBVR/20070901/SBVR.xml>

1.3. Acronyms

CRISG 2.3

See: [Car Rental Industry Standard Glossary 2.3](#)

CH-CD 1.0

See: [Conceptual Heaven Concept Diagrams 1.0](#)

CH-EURENT 1.0

See: [Conceptual Heaven EU-Rent Example 1.0](#)

CH-SBVR 1.0

See: [Conceptual Heaven for SBVR 1.0](#)

CH-VDOC 1.0

See: [Conceptual Heaven Vocabulary Documents 1.0](#)

LDCE

See: [Longman Dictionary of Contemporary English](#)

SBVR 1.1

See: [Semantics of Business Vocabulary and Rules 1.1](#)

SBVR-Ann 1.1

See: [Semantics of Business Vocabulary and Rules 1.1, Annexes C-D-E](#)

1.4. Communities and parties

CH

See: [Conceptual Heaven](#)

[Conceptual Heaven](#)

See: www.conceptualheaven.com

Abbreviation: CH

[EU-Rent](#)

Definition: A fictitious international car rental company that trades as "EU-Rent"

[Car Rental Industry](#)

Definition: The [SBVR 1.1:] [semantic community](#) that is the group of people who work in the business of renting cars.

[Object Management Group](#)

See: www.omg.org

Abbreviation: OMG

OMG

See: [Object Management Group](#)

2. Fundamental concepts

2.1 Text concepts

name

Source: [SBVR](#) ['name' (11.2)]

Role in: [branch](#) *is identified by* [text](#)

Role in: [locality](#) *is identified by* [text](#)

2.2 Number concepts

integer

Source: [SBVR 1.1](#) ['integer' (8.6)]

number

Source: [SBVR 1.1](#) ['number' (8.6)]

2.3 Time concepts

current date/time

Definition: The date/time of now.

date

Definition: A specific day on the calendar

Synonym: [day](#)

date/time

Definition: A specific clock time on a specific day on the calendar

day

See: [date](#)

duration

Definition: A stretch of time considered independently of the calendar

Example: 7 days

end date/time

sequence of days

Definition: A set of contiguous days on the calendar.

Reference scheme: The combination of a day on the calendar when the sequence starts and an integer indicating the number of days contained in the sequence of days.

time period

Definition: A specific time interval on the calendar

time period has start date/time

See: time period starts at date/time

time period has end date/time

See: time period ends at date/time

time period starts at date/time

Role: The term start date/time is used to refer to a date/time when a time period starts.

Synonymous Form: time period has start date/time

Necessity: A time period must start at exactly one date/time.

Necessity: The date/time when a time period starts must be earlier than the date/time when it ends.

time period ends at date/time

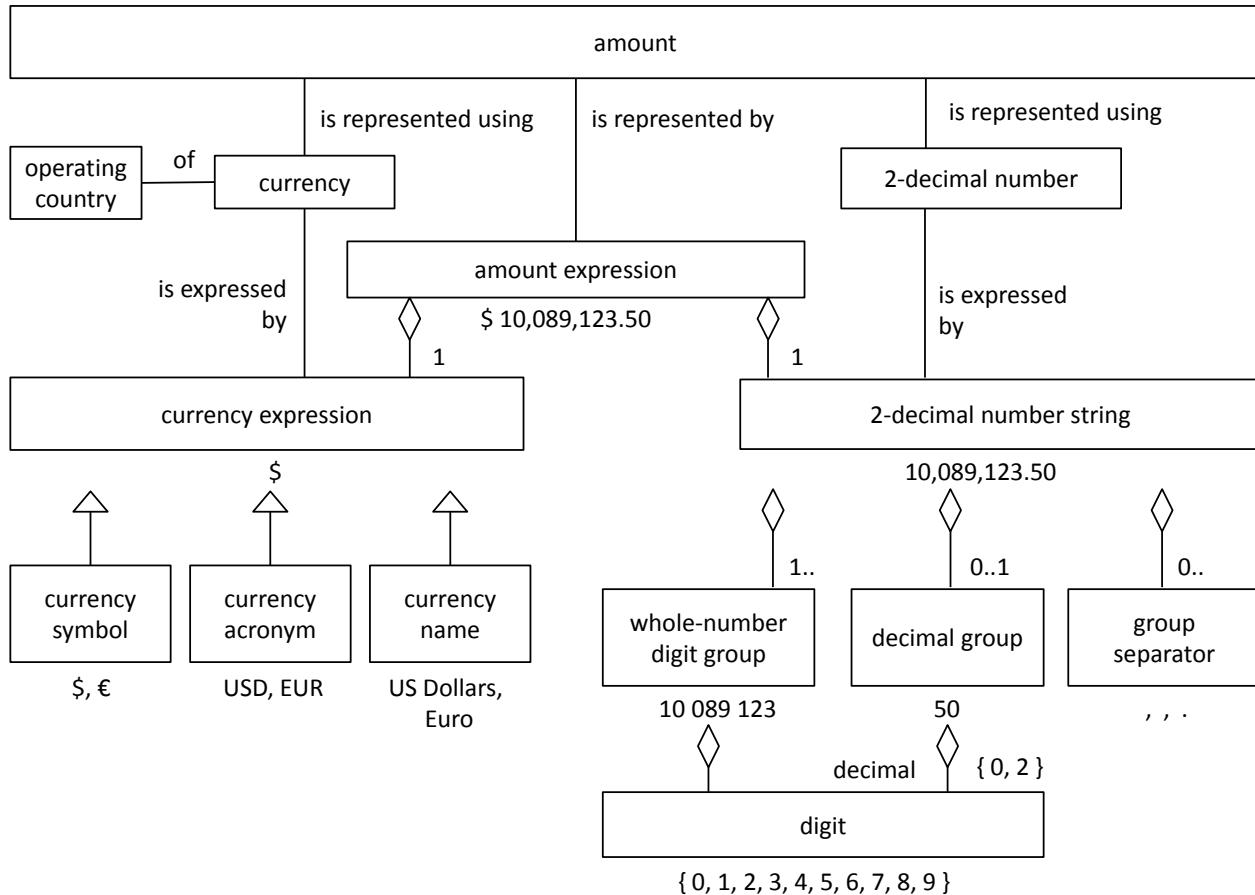
Role: The term end date/time is used to refer to a date/time when a time period ends.

Synonymous Form: time period has end date/time

Necessity: A time period must end at exactly one date/time.

Necessity: The date/time when a time period ends must be later than the date/time when it starts.

2.4 Amount concepts



2-decimal number

Definition: A number with a maximum precision of 2 decimals.

2-decimal number is expressed by 2-decimal number string

2-decimal number string

Definition: A number with a maximum precision of 2 decimals.

Note: A 2-decimal number string indicates whether a digit is a decimal or not by either expressing 2 decimals or no decimals at all.

2-decimal number string includes whole-number digit group

Necessity: A 2-decimal number string includes at least one whole-number digit group.

2-decimal number string includes decimal group

2-decimal number string includes group separator

amount

Definition: A sum of money

Reference scheme: The combination of the currency used to represent the amount and the 2-decimal number used to represent the amount

amount expression

Definition: A character string that represents an amount.

Note: The same amount may be represented by a variety of amount expressions. The amount expressions "€ 38 000" and "38.000 Euro" both represent the same amount.

amount expression includes currency expression

Necessity: An amount expression includes exactly one currency expression.

Note: In an amount expression, the currency expression may be placed at the beginning ("€ 38 000") or at the end ("38 000 €") with no change of meaning.

Note: Preferably, a space is inserted between the currency expression and the 2-decimal number string: "€ 3800" rather than "€3800".

amount expression includes 2-decimal number string

Necessity: An amount expression includes exactly one 2-decimal number string.

amount is represented using 2-decimal number

amount is represented using currency

currency

Definition: The particular kind of money in use in a country [LDCE 'currency']

currency acronym

Example: EUR

Example: USD

currency expression

Necessity: Each currency expression is exactly one of the following:

- A currency symbol.
- A currency acronym.
- A currency name.

currency name

Example: Euro

Example: US Dollar

currency symbol

Example: \$

Example: €

currency is expressed by currency expression

decimal

Role In: decimal group includes digit

Example: "5" in "10,300.50".

decimal group

Definition: A sequence of two contiguous digits at the end of a 2-decimal number string and separated from the remainder of that 2-decimal number string by a group separator that is either a full stop (.) or a comma (,).

Example: "50" in "10,300.50".

decimal group includes digit

Role: The term **decimal** is used to designate a digit in its role of being included in a digital group.

Necessity: A decimal group either contains no digits (is empty, is not represented on paper) or it contains exactly 2 digits.

Note: "10,300.5" is not a legal expression of "10,300.50" because the decimal group includes one digit instead of two.

digit

Definition: "0" or "1" or "2" or "3" or "4" or "5" or "6" or "7" or "8" or "9".

group separator

- Definition: A character used to separate whole-number digit groups and decimal groups in a 2-decimal number string for easier reading.
- Necessity: A group separator is either a space (" ") or a full stop (".") or a comma (",").
- Necessity: To separate decimals from the remainder of a 2-decimal number string, only a full stop (".") or a comma (",") may be used.
- Necessity: If a full stop (".") is used to separate decimals from the remainder of a 2-decimal number string, then a comma (",") must be used to separate whole-number digit groups in that 2-decimal number string: "10,300.50" and not "10.300.50" or "10 300.50".
- Necessity: If a comma (",") is used to separate decimals from the remainder of a 2-decimal number string, then a full stop (".") must be used to separate whole-number digit groups in that 2-decimal number string: "10.300,50" and not "10,300,50" or "10 300,50".
- Possibility: It is not necessary to use a group separator to separate whole-number digit groups expressing integers greater than 999. A group separator is just a reading aid.
- Note: Anglo-saxon countries conventionally use a comma (",") to separate decimals from the remainder of a 2-decimal number string.
- Note: Continental European countries conventionally use a full stop (".") to separate decimals from the remainder of a 2-decimal number string.

whole-number digit group

- Definition: A group of contiguous digits that contribute to expressing a number in a character string and that are not decimals.
- Example: "300" in "10,300.50".
- Example: "10" in "10 000".
- Example: "1200" in "1200".

whole-number digit group includes digit

2.5 Other

person

Definition: A human being

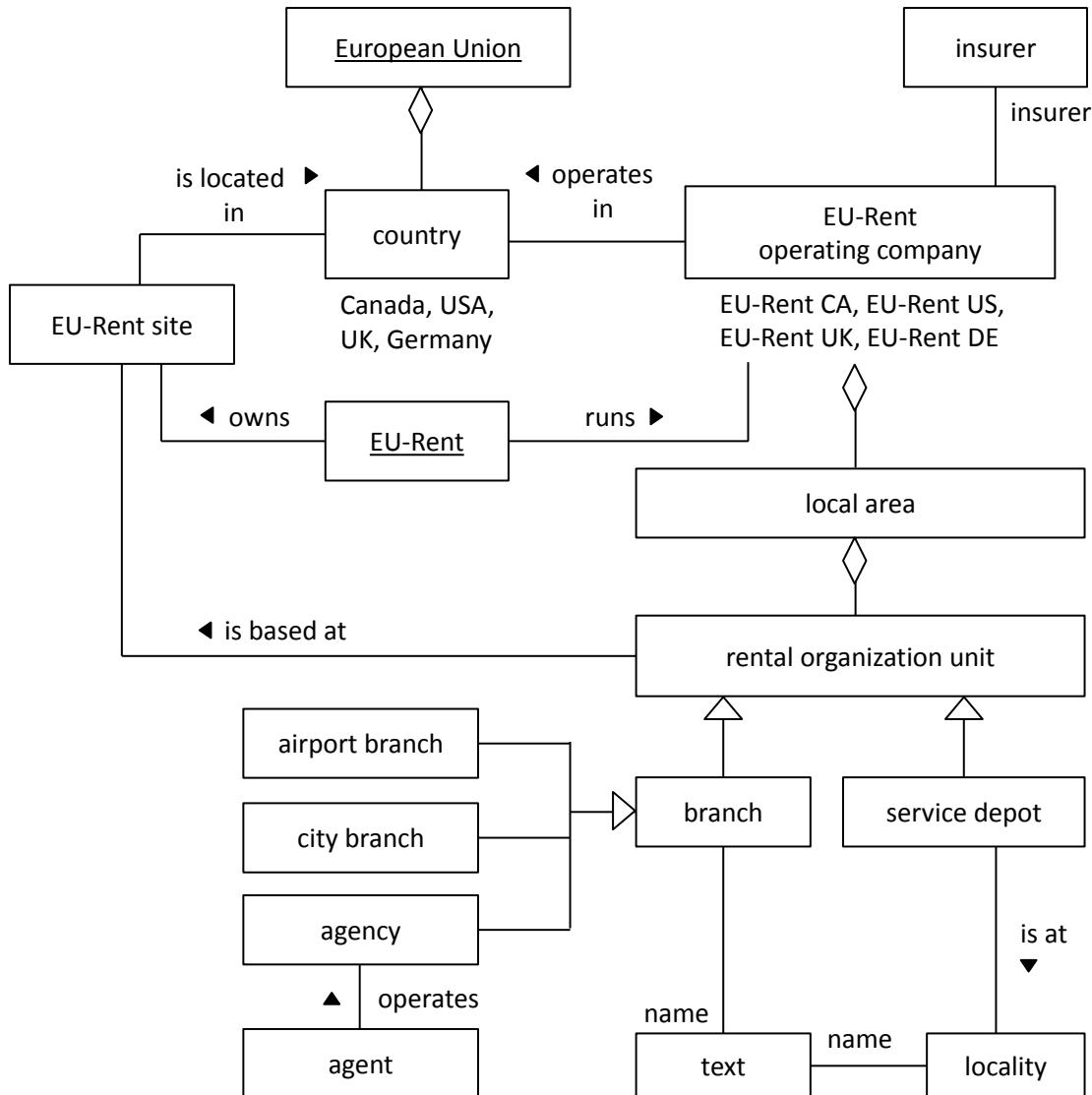
Dictionary Basis: A human being considered as having a character of his or her own (...)[LDCE ('person')]

start date/time

text

Source: [SBVR 1.1](#) ['text' (8.2)]

3. EU-Rent organization



agency

Definition: **Branch** operated by an external organization that carries out rental business on behalf of EU-Rent

Note: **Agencies** are not usually *based at* an **EU-Rent site** owned by **EU-Rent**.

Note: **Agencies** usually have limited car storage capacity.

Note: **Agencies** usually have on-demand operation.

agent

Definition: Organization external to EU-Rent that carries out car rental business on behalf of EU-Rent

agent operates agency

airport branch

Definition: [Branch](#) located at or very near a major airport or rail terminal, that is based at an EU-Rent site owned by EU-Rent, that has 24-7 operation

Note: [Airport branches](#) usually have large car storage.

branch

Definition: [Rental organization unit](#) that is responsible for the operation of customer-facing rental business

Reference scheme: [Name of branch](#)

Necessity: Each [branch](#) is exactly one of the following:

- [airport branch](#)
- [city branch](#)
- [agency](#)

branch is identified by text

Role: The term [name](#) is used to refer to a [text](#) in its role of *identifying* a [branch](#).

Canada

General concept: [country](#)

city branch

Definition: [Branch](#) located in a city center, that is based at an EU-Rent site owned by EU-Rent, and that has long business hours

Note: A city branch usually has moderate car storage.

Note: A city branch usually has a small number of staff who are interchangeable in the workflow.

country

Example: [Canada](#)

Example: [Germany](#)

Example: [UK](#)

Example: [USA](#)

EU-Rent CA

Definition: The [EU-Rent operating company](#) that *operates in Canada*.

General concept: [EU-Rent operating company](#)

EU-Rent DE

Definition: [The EU-Rent operating company that operates in Germany.](#)

General concept: [EU-Rent operating company](#)

EU-Rent operating company

Definition: Organization that does business in a specific country on behalf of EU-Rent

Note: An EU-Rent operating company:

- adapts global policy to local regulation, custom, and practice,
- selects which car models will be purchased for each car group,
- sets rental tariffs.

EU-Rent operating company includes local area

EU-Rent operating company operates in country

EU-Rent operating company has insurer

EU-Rent UK

Definition: [The EU-Rent operating company that operates in the UK.](#)

General concept: [EU-Rent operating company](#)

EU-Rent US

Definition: [The EU-Rent operating company that operates in the USA.](#)

General concept: [EU-Rent operating company](#)

European Union

Definition: The group of European countries that participate in collaboration agreements ratified and executed at supra-national level.

Note: Membership of the European Union does not necessarily imply the adoption of the Euro currency.

European Union includes country

Necessity: [Germany is a country that is included in the European Union.](#)

Necessity: [The UK is a country that is included in the European Union.](#)

Necessity: The USA is a country that is not included in the European Union.

Necessity: Canada is a country that is not included in the European Union.

Germany

General concept: country

insurer

local area

Definition: A set of rental organization units that are located in the same geographical region and that include:

- a number of branches for rental car pick-up and return.
- a number of service depots.
- one or more locations that are responsible for coordinating operations and ensure resources within the EU-Rent operating company.

Necessity: All rental organization units in a local area are in the same EU-Rent operating company.

local area includes rental organization unit

locality

Definition: The town, city, area or facility where something is located.

locality is identified by text

Role: The term name is used to refer to a text in its role of *identifying* a locality.

rental organization unit

Definition: Organization that operates part of EU-Rent's car rental business

Possibility: A rental organization unit may be a branch, or a service depot, or both at the same time, or neither.

Note: A rental organization unit that is neither a branch nor a service depot will have offices only.

rental organization unit is based at EU-Rent site

Necessity: A rental organization unit is based at exactly one EU-Rent site.

service depot

Definition: Rental organization unit that is responsible for maintenance and servicing of rental cars.

Reference scheme: The name of the locality that the service depot is at.

service depot is at locality

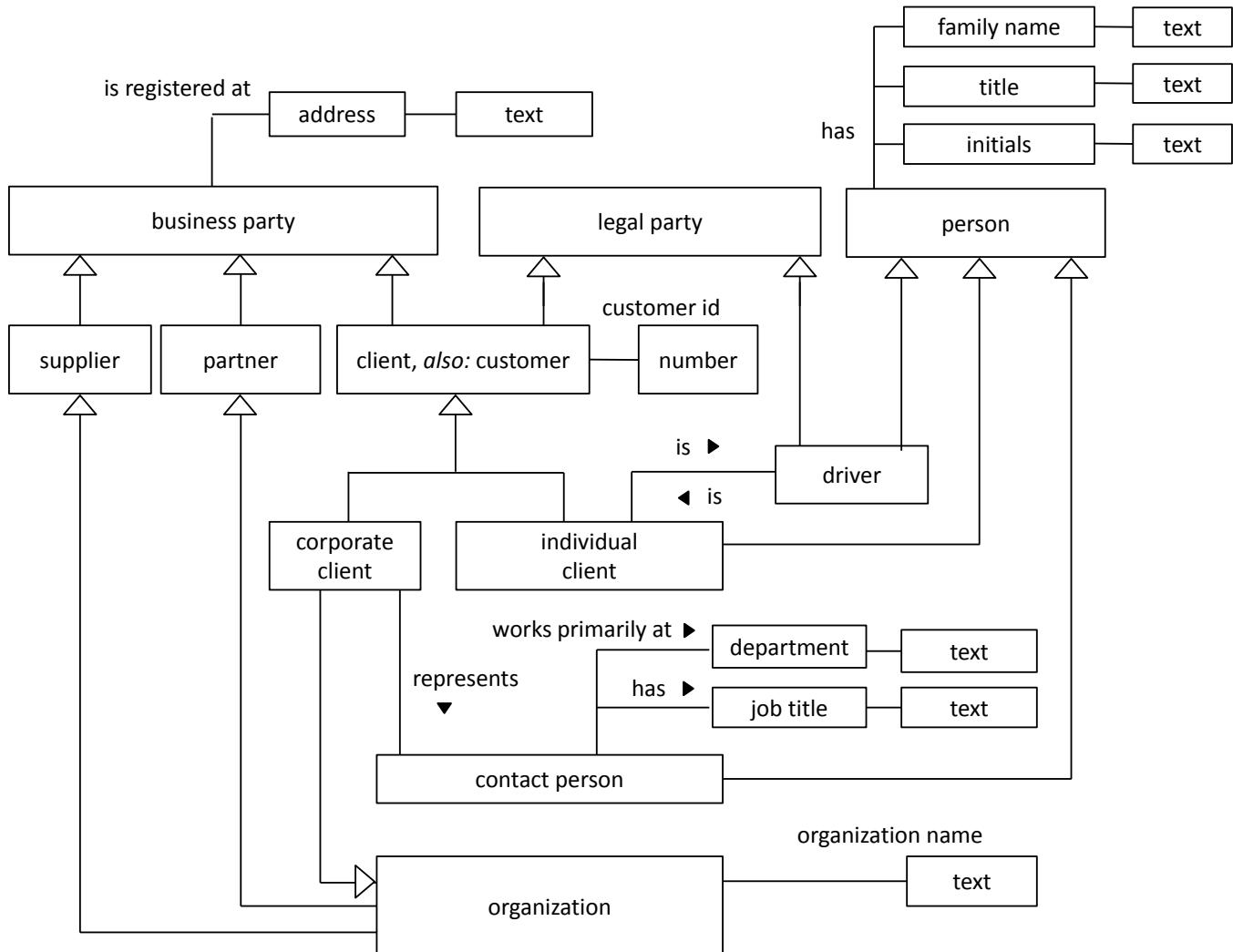
UK

General concept: country

USA

General concept: country

4. Business parties



4.1 People and organizations

address

address is represented by text

business party

Definition: a person or organization external to EU-Rent that EU-Rent does business with

business party *is registered at address*

customer

See: [client](#)

client

Definition: A business party that submits a rental request or agrees to a rental proposition made by EU-Rent.

Synonym: [customer](#)

Category of: [business party](#)

Category of: [legal party](#)

Necessity: The client of a rental is the same client who agreed to the rental agreement that that rental is based on.

Note: In a stricter definition of client, a business party would become a client by signing a rental agreement. EU-Rent chooses to widen the definition of client to include business parties who request a rental, because a systematic distinction between aspirant clients and actual clients is not practical for the business.

client is identified by number

Role: The term customer ID is used to refer to a number in its role of *identifying* a client.

Necessity: Each client must be identified by exactly one customer ID.

Necessity: A customer ID may not identify more than one client.

Note: Customer IDs are specific to EU-Rent and assigned by EU-Rent, as opposed to ID numbers found on pieces of identification.

contact person

Definition: a person who acts on behalf of a corporate client that EU-Rent does business with.

Category of: [person](#)

contact person acts on behalf of corporate client

See: [contact person represents corporate client](#)

contact person has job title

contact person represents corporate client

Synonymous: [contact person acts on behalf of corporate client](#)

Form:

Necessity: A contact person must *represent* exactly one corporate client.

contact person works primarily at department

corporate client

Definition: A client that *is* an organization.

customer ID

Role In: client *is identified by* number

department

department *is represented by* text

driver

driver *is* individual client

Definition: The driver *is* the same person as the individual client.

family name

family name *is represented by* text

individual client

Category of: person

Definition: A client who *is* a person

individual client *is* driver

See: driver *is* individual client

initials

initials *are represented by* text

job title

job title *is represented by* text

legal party

Definition: a person or organization that EU-Rent deals with, considered from the perspective of the rights and responsibilities that this person or organization has.

organization

organization is represented by text

Role: The term 'organization name' is used to refer to text that *represents* an organization.

organization name

Role in: organization is represented by text

partner

Definition: A business party that EU-Rent collaborates with in sales, marketing or delivery activities

Example: a repair shop

Example: a travel agency

person has family name

person has initials

person has title

supplier

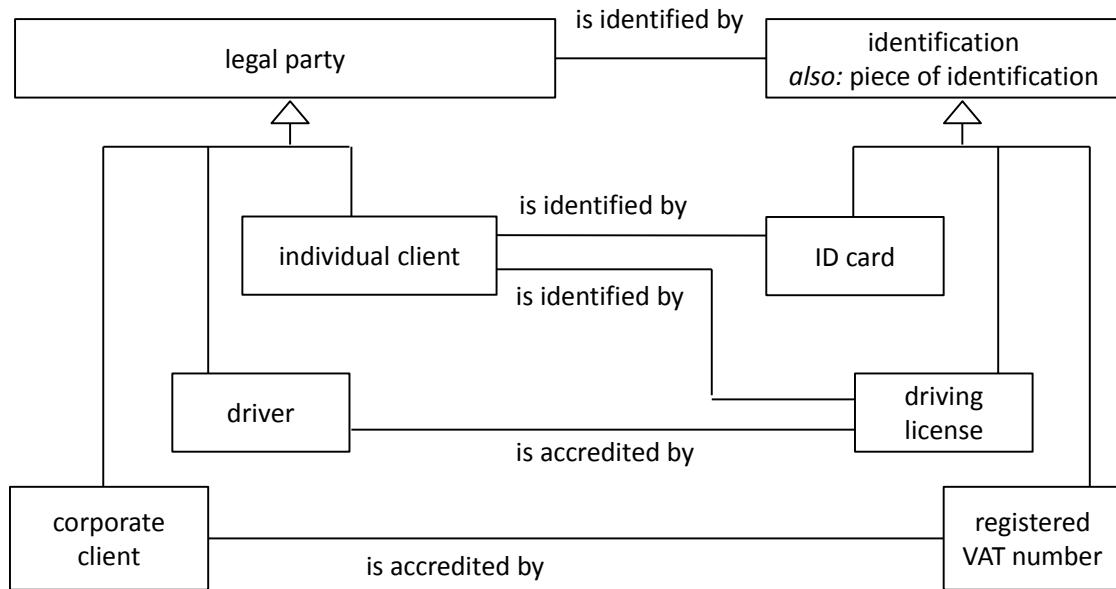
Definition: A business party that EU-Rent procures goods or services from in order to fulfil its own delivery tasks

Example: a car manufacturer

title

title is represented by text

4.2 Identification and accreditation



corporate client is accredited by registered VAT number

Definition: The **registered VAT number** is proof that the **corporate client** has the requisite legal status and credibility.

driver is accredited by driving license

Definition: The **driving license** document is proof that the **driver** has the requisite driving capability.

driving license

Category of: **identification**

ID card

Category of: **identification**

identification

Definition: A legal document or code bearing, or consisting of, a number or other descriptive element that may be used to refer unambiguously to a given person or organization and that can be used to establish the legal status and credibility of that person or organization.

Synonym: **piece of identification**

Example: **ID card**

Example: **driving license**

Example: [registered VAT number](#)

[individual client is identified by driving license](#)

Definition: The [driving license](#) document is an adequate means of verifying who the [individual customer is](#).

[individual client is identified by ID card](#)

Definition: The [ID card](#) document is an adequate means of verifying who the [individual client is](#).

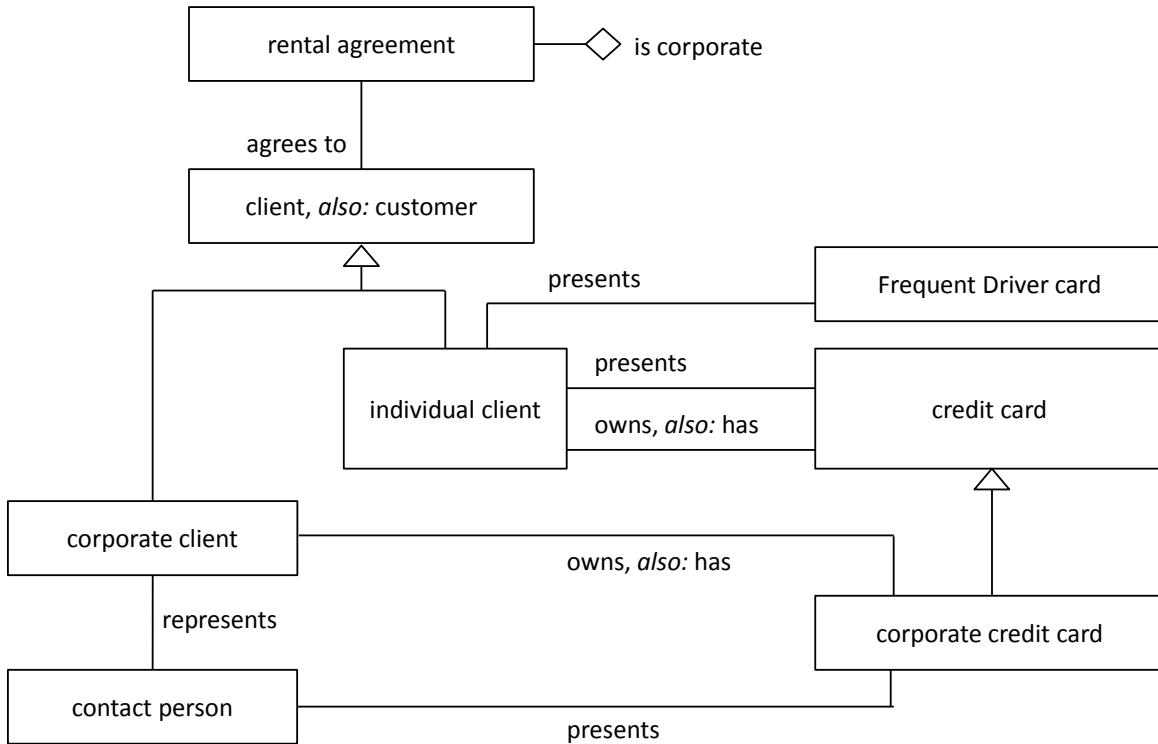
[legal party is identified by identification](#)

Definition: The [identification](#) is an adequate means of verifying who the [legal party is](#).

[piece of identification](#)

See: [identification](#)

4.3 Identification and payment



[contact person presents corporate credit card](#)

Definition: The [contact person](#) uses the [corporate credit card](#) ID as a means of payment or submits the card to an EU-Rent official with the purpose of letting this official use the [corporate credit card](#).

ID as a means of payment.

Necessity: A corporate credit card presented by a contact person must be considered to be owned by the corporate client that that contact person represents.

corporate client has corporate credit card

Derived from: client has credit card

Synonymous form: corporate client owns corporate credit card

corporate client owns corporate credit card

Synonymous form: corporate client has corporate credit card

corporate credit card

Category of: credit card

credit card

Frequent Driver card

individual client has credit card

Derived from: client has credit card

Synonymous form: individual client presents credit card

individual client presents credit card

Definition: The individual client uses the credit card ID as a means of payment or submits the card to an EU-Rent official with the purpose of letting this official use the credit card ID as a means of payment.

Synonymous form: individual client has credit card

individual client presents Frequent Driver card

Definition: The individual client mentions the Frequent Driver card ID and thereby expresses his or her right to benefits defined as part of the Frequent Driver loyalty program.

organization is accredited by registered VAT number

Definition: The term registered VAT number is proof that the organization is a properly registered and credible business.

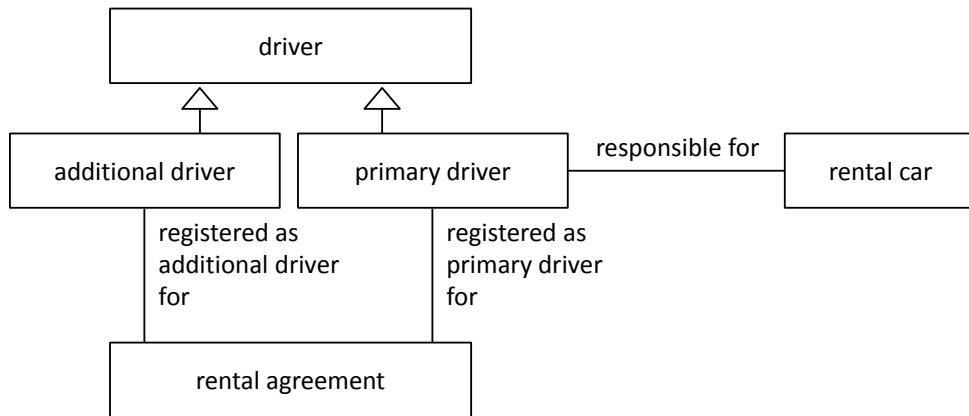
registered VAT number

Category of: identification

rental agreement is corporate

Definition: *The rental proposition is agreed to by a contact person acting on behalf of a corporate client, as opposed to being agreed to by an individual client.*

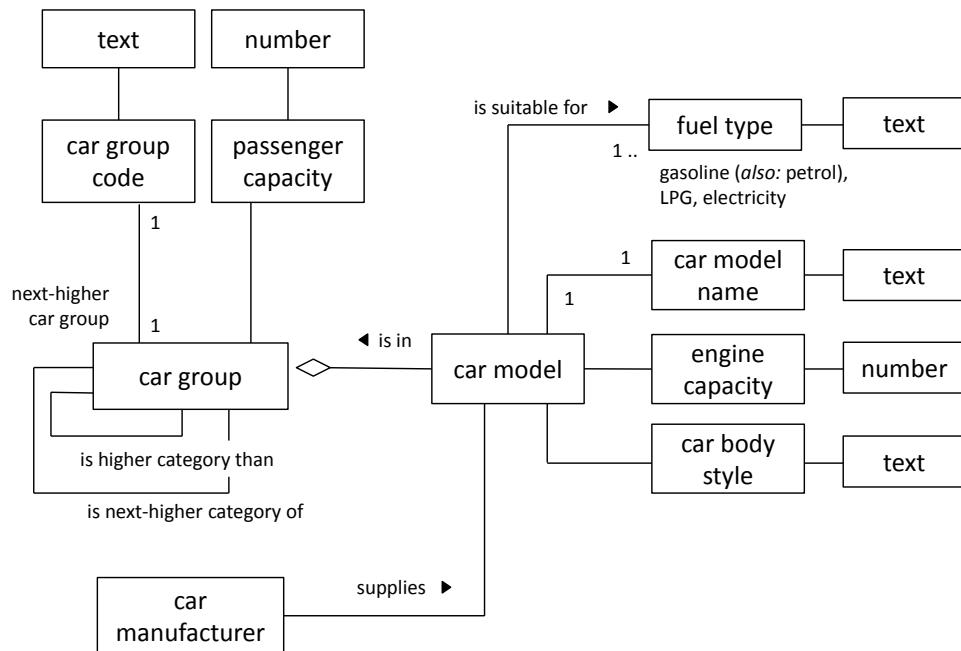
4.4 Driver responsibility



primary driver is responsible for rental car

5. Car specifications

This section is an example of a consistent approach to data representation.



car body style

Example: sedan

Example: coupe

Example: convertible

car body style is represented using text

car group

Source: [CRISG \('rate group'\)](#)

Note: Different models of car are offered for rental, organized into groups which establish a price point.

car group code

Definition: [Text that uniquely represents a car group](#)

Definition: [A, B, C, D, or E](#)

car group has passenger capacity

Definition: The [passenger capacity](#) indicates the maximum number of persons that the car

manufacturer specifies may travel in a car included in the [car group](#), counting the driver as one passenger.

Note: Car manufacturers specify passenger capacity by car model. EU-Rent only includes car models with the same passenger capacity in any one car group.

[**car group is uniquely represented by car group code**](#)

[**car group is uniquely represented by text**](#)

[**car group₁ is higher category than car group₂**](#)

Definition: The category of [car group₁](#) is a higher-price category than the category of [car group₂](#).

[**car group₁ is next-higher category of car group₂**](#)

Definition: The [car group₁](#) is the next-higher price category compared to [car group₂](#).

Role: The term 'next-higher car group' is used to refer to a car group 1 in its role of being next-higher category of car group 2.

[**car manufacturer**](#)

Definition: Producer of cars that EU-Rent has decided to do business with

Example: Ford Motor Company

Example: General Motors

Example: Toyota Corporation

[**car manufacturer supplies car model**](#)

[**car model**](#)

Source: [CRISG](#) ['car model']

Example: Ford Focus

Example: Ford Escort

Example: Chevrolet Cavalier

Note: Cars of a given model are all built to the same specification, e.g., body style, engine size, fuel type. EU-Rent bases its model names on those assigned by the car manufacturers, but sometimes has to extend them to distinguish models with different engine sizes and numbers of doors.

[**car model has car body style**](#)

[**car model has engine capacity**](#)

car model *is in* car group

Necessity: Each car model *is in* exactly one car group.

car model *is suitable for* fuel type

Definition: The car model is designed to take the fuel type.

Possibility: Some car models *are suitable for* more than one fuel type, e.g. they can switch between gasoline and LPG, or between electricity and gasoline.

car model *is uniquely represented by* car model name

car model name

Definition: Text used to uniquely represent a car model

Example: "Ford Focus"

car model name *is represented using* text

electricity

General concept: fuel type

engine capacity

Source: CRISG ['engine size']

engine capacity *is represented using* number

fuel type

Definition: gasoline, LPG or electricity

Source: CRISG ['fuel type']

fuel type *is represented by* text

gasoline

Synonym: petrol

General concept: fuel type

LPG

General concept: fuel type

next-higher car group

Role in: car group₁ *is next-higher category of* car group₂.

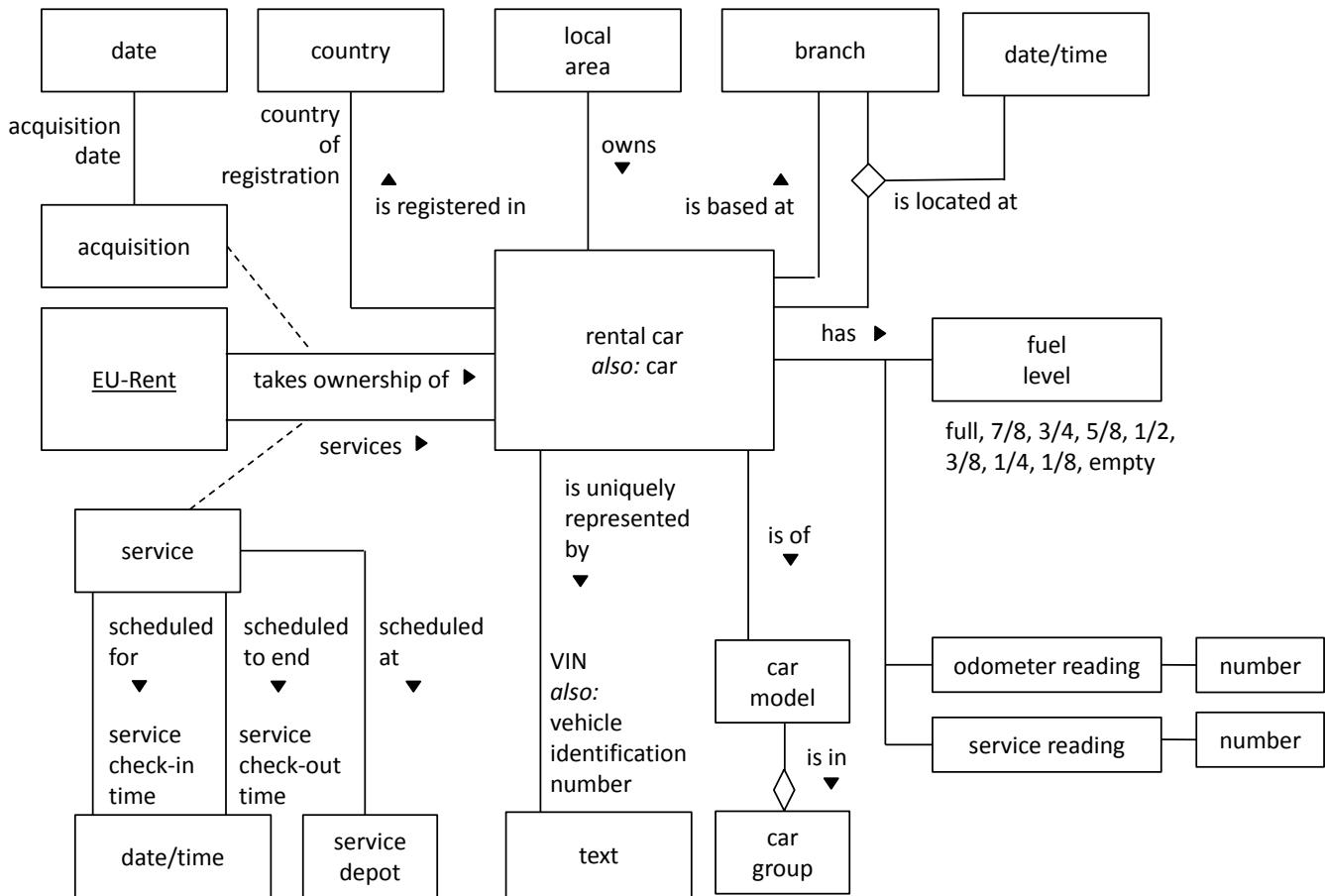
passenger capacity

passenger capacity *is represented using* number

petrol

See: gasoline

6. Rental cars



acquisition

Definition: **The fact that EU-Rent takes ownership of a rental car .**

acquisition date

acquisition occurs on date

Role: **acquisition date**

car

See: **rental car**

country of registration

Role: The term '**country of registration**' is used to refer to a **country** in its role of being the **country** that a **rental car** **is registered in**.

empty

General concept: [fuel level](#)

EU-Rent services rental car

Necessity: EU-Rent must service a rental car when that rental car's service reading reaches 5000 miles (8000 km).

EU-Rent takes ownership of rental car

fuel level

Definition: The amount of fuel in a rental car compared to when the tank is full

Necessity: The fuel level of a rental car must be expressed as:

[Full](#) or [7/8](#) or [3/4](#) or [5/8](#) or [1/2](#) or [3/8](#) or [1/4](#) or [1/8](#) or [empty](#)

Source: [CRISG](#) ['fuel level']

full

General concept: [fuel level](#)

local area owns rental car

odometer reading

Definition: Action of determining the total number of kilometers covered by a rental car by checking the dashboard display

Source: [CRISG](#) ['odometer reading']

Category of: [number](#)

odometer reading is expressed by number

rental car

Definition: A 3-wheel or 4-wheel motorised vehicle primarily intended for the transport of persons and offered by EU-Rent for fulfilment of rental agreements.

Reference scheme: [VIN of rental car](#)

Synonym: [car](#)

rental car has fuel level

rental car has odometer reading

rental car has service reading

rental car is based at branch

Definition: The branch is responsible for:

- tracing and planning the whereabouts of the rental car as car transfers occur.
- the maintenance and servicing of the rental car.

rental car is located at branch at date/time

rental car is of car model

rental car is registered in country

rental car is uniquely represented by text

Role: The term 'vehicle identification number' (VIN) is used to refer to text that uniquely represents a rental car.

service

Definition: Regular maintenance service session for a rental car.

Definition: **The fact that EU-Rent services a rental car.**

Category of: car movement reason

service check-out time

Definition: **Date/time that a service is scheduled to end at**

service check-in time

Definition: **Date/time that a service is scheduled for**

service is scheduled for date/time

service is scheduled at service depot

service is scheduled to end at date/time

service reading

Definition: The number of kilometres a car has covered since its last service.

Necessity: A car's service reading must be determined by subtracting the car's previous service reading from that car's odometer reading.

service reading is expressed by number

vehicle identification number

See: VIN

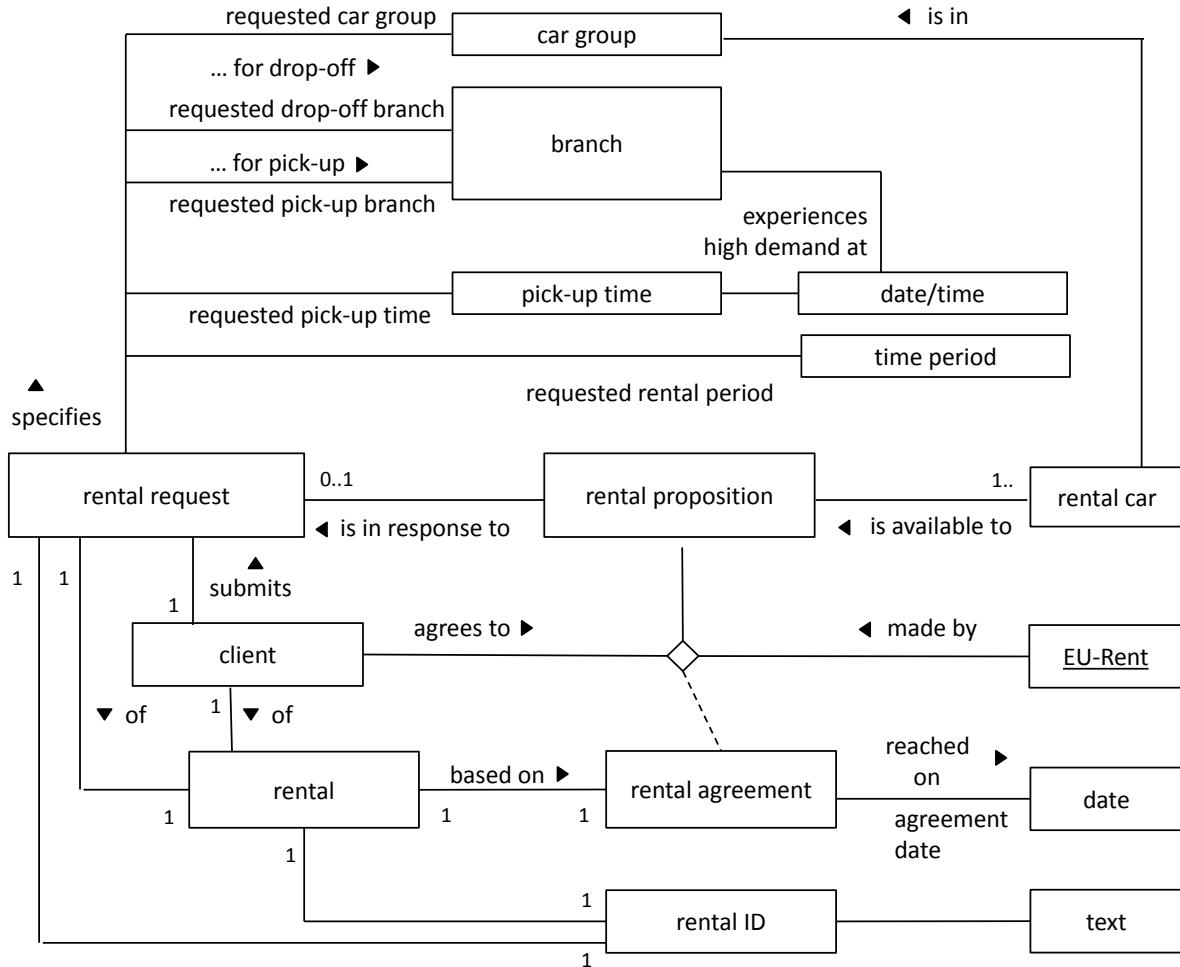
VIN

Synonym: vehicle identification number

Role in: rental car is uniquely represented by text

7. Rental agreements

This section illustrates how noun concepts are built around typical stages in transactions between business parties such as request, promise, deliver, accept.



7.1 Rental agreement vocabulary

agreement date

Role in: rental agreement is reached on date

Role in: rental is agreed on date

branch experiences high demand at date/time

Definition: A branch must be considered to experience high demand at a date/time when the number of rental requests that specify the branch and the date/time exceeds the number of cars available to rental requests at the branch at the date/time by at least 20 %.

Example: The number of cars available for rental requests at a given branch at a given date/time is 50. The total number of rental requests specifying the branch and the date/time is 65. The branch is considered to experience high demand at the date/time because the difference (15) is more than 20 % of 50 (= 10).

client agrees to rental proposition made by EU-Rent

client is of rental

Definition: The client *has agreed to* the rental proposition *of* the rental agreement that the rental *is based on*.

client submits rental request

pick-up time

Role in: client picks up rental car at branch at date/time

pick-up time is expressed by date/time

rental

Definition: Planned and actual actions taken as a result of a rental agreement; the entire business of rental fulfilment that ensues from the occurrence of a rental agreement.

Reference scheme: Rental ID of rental

General concept: car movement reason

Necessity: The rental ID of a rental *is* the same as the rental ID of the rental request that the rental is based on.

rental agreement

Definition: The fact that a client agrees to a rental proposition made by EU-Rent.

Definition: Contract between EU-Rent and a client for use of a rental car by the renter for an agreed period under the rental company's terms and conditions for such use.

Dictionary basis: Contract for use of a rental car by a renter for an agreed period under the rental company's terms and conditions for rental. [CRISG 2.3]

rental agreement is reached on date

Role: The term 'agreement date' is used to refer to a date on which a rental agreement is reached.

rental car is available to rental proposition

Definition: The rental car meets all the conditions specified by the rental proposition and *is not allocated*

to a rental.

Role: The term 'same-group match' is used to refer to a rental car in its role of rental car available to a rental proposition that is in response to a rental request if that rental car is in the requested car group of the rental request.

Role: The term 'upgrade match' is used to refer to a rental car in its role of rental car available to a rental proposition that is in response to a rental request if that rental car is in the next-higher category of the requested car group of the rental request.

rental ID

Example: "UK-39476800254-E"

rental ID is expressed by text

rental is uniquely represented by rental ID

Necessity: The rental ID of a rental must be the rental ID of the rental request that the rental proposition of the rental agreement was in response to.

rental is based on rental agreement

Definition: The rental is created as a result of the rental agreement having been reached.

Necessity: A rental is based on exactly one rental agreement.

Necessity: For each rental agreement there is exactly one rental that that rental agreement is based on.

rental proposition

Definition: The intention to consider a specific rental option as being the subject of a rental agreement between EU-Rent and a specific client.

Necessity: A rental proposition that is in response to a rental request must be for a rental option for a rental car available to the rental request.

rental proposition is in response to rental request

Necessity: A rental proposition is in response to at most one rental request.

Possibility: It is possible that a rental proposition is not in response to a rental request.

Note: A rental proposition may come about not in response to a rental request (an initiative of the client) but in the context of an EU-Rent initiative, e.g., when EU-Rent advertises a particular offering.

rental request

Definition: The fact that a client requests that EU-Rent make available a rental car under specified

conditions.

rental request is uniquely represented by rental ID

rental request specifies branch for drop-off

Role: The term 'requested drop-off branch' is used to refer to a branch in its role of branch specified for drop-off by a rental request.

Necessity: A rental request must specify exactly one branch for drop-off.

rental request specifies branch for pick-up

Role: The term 'requested pick-up branch' is used to refer to a branch in its role of branch specified for pick-up by a rental request.

Necessity: A rental request must specify exactly one branch for pick-up.

rental request specifies car group

Role: The term 'requested car group' is used to refer to a car group in its role of car group specified by a rental request.

Necessity: A rental request must specify exactly one car group.

rental request specifies pick-up time

Role: The term 'requested pick-up time' is used to refer to a pick-up time specified by a rental request.

Necessity: A rental request must specify exactly one pick-up time.

rental request specifies time period

Role: The term 'requested rental period' is used to refer to a time period specified by a rental request.

Necessity: A rental request must specify exactly one rental period.

rental request underlies rental

Necessity: The rental is based on the rental agreement in which the client and EU-Rent agreed to the rental proposition that the rental request was in response to.

requested car group

Role in: rental request specifies car group

requested drop-off branch

Role in: rental request specifies branch for drop-off

requested pick-up branch

Role in: rental request specifies branch for pick-up

requested pick-up time

Role in: rental request specifies pick-up time

requested rental period

Role in: rental request specifies time period

same-group match

Role in: rental car is available to rental proposition

upgrade match

Role in: rental car is available to rental proposition

7.2 Rule Set: Booking process rules

Booking process rules

Definition: Rules governing the process of booking rentals.

Note: These rules do not have individual codes. They are provided for process designers.

Note: The definition of rental agreement in this rule set is an example of a duplicated noun concept definition. The drawback of such a duplication is loss of single-point-of-definition. The advantage is that the rule set becomes more readable. This definition has the Definition label. According to the Conceptual Heaven meta-model of simplified SBVR, the Necessity label (corresponding to the concept of structural rule) would have been equally correct.

Necessity: EU-Rent must evaluate for each rental request whether it is able to make a rental proposition in response to that rental request.

Possibility: EU-Rent may make rental propositions that are not in response to a specific rental request.

Necessity: To each rental proposition, a rental car must be available at the time when the rental proposition is made.

Definition: A rental agreement is the fact that a client agrees to a rental proposition made by EU-Rent.

Necessity: Each rental is based on exactly one rental agreement.

Note: The quoted price associated with a rental proposition is beyond the scope of this example model.

7.3 Rule Set: Availability rules

Availability rules

Definition: Rules governing which rental car(s) (if any) may be considered available to a rental proposition.

Note: Rules in this rule set have a code starting with AV-.

Note: This rule set is expressed as a set of restrictions. The assumption is that EU-Rent will do its utmost to make available as many cars as possible within the boundaries stated by these restrictions.

AV-001 – Price category match

Necessity: A car may only be considered available to a rental proposition if it is in the requested car group of the rental request or if it is in a car group that is a higher category than that requested car group.

AV-002 – Logistical feasibility

Necessity: A rental car may only be considered available to a rental proposition if it is possible for that rental car to be located at the requested pick-up branch of the rental request at the requested pick-up time.

Necessity: It may be considered possible for a rental car to be located at a given branch at a given date/time only if one of the following apply:

- Scheduled car movements cause the rental car to be located at the branch at the date/time.
- There is both time and staff available to perform an in-area transfer that causes the rental car to be located at the branch at the date/time.
- The branch experiences high demand at the date/time and there is both time and staff available to perform an in-country transfer that causes the rental car to be located at the branch at the date/time.

AV-003 – Competing reservations

Necessity: A car may only be considered available to a rental request if it is not assigned to a different rental during all or part of the requested rental period.

Rule set: Availability rules

AV-004 – Booking threshold

Necessity: At each branch at each date/time, the number of rental cars specified by the booking threshold must be kept for walk-in rentals.

Rule set: [Availability rules](#)

Note: The cars below the booking threshold are not available to advance rentals.

booking threshold

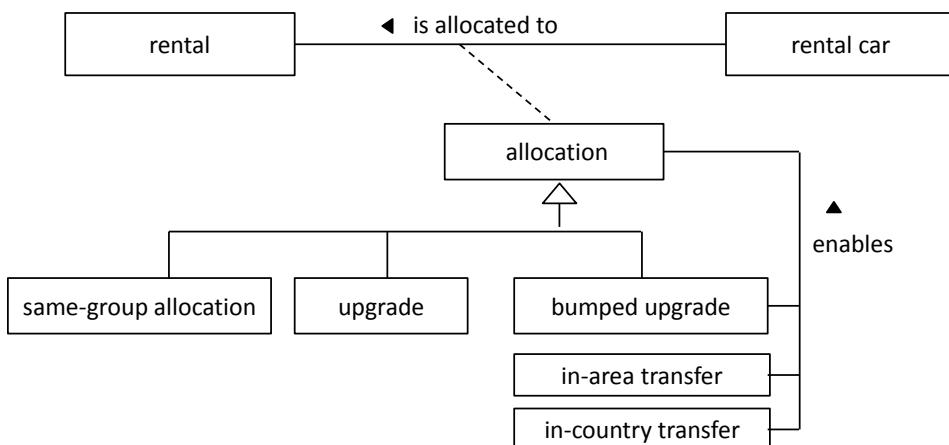
Definition: A percentage of the total number of rental cars expected to be located at a given branch at a given date/time that must be kept available for walk-in rentals.

Necessity: The [booking threshold](#) observed by [EU-Rent](#) is [10 %](#).

Used in: [AV-004](#)

8. Car allocation

This section is an example of a vocabulary that accommodates a manageable natural-language expression of a complex rule set.



8.1 Car allocation vocabulary

allocation

Definition: The fact that a [rental car](#) is [allocated to](#) a [rental](#).

bumped upgrade

Definition: An [allocation](#) by which an allocated car is replaced by a car from the next-higher car group in order to enable another allocation.

Example: A rental request specifies car group C. There is no available car in car group C or car group B, but a reserved car from group B can be replaced by an available car from group A. This replacement makes possible that the freed-up car in group B matches the rental request for group C.

bumped upgrade enables allocation

Definition: The bumped upgrade frees a rental car for the allocation and no rental car would otherwise be available to that allocation.

Example: A rental request specifies car group C. There is no available car in car group C or car group B, but a reserved car from group B can be replaced by an available car from group A. This replacement makes possible that the freed-up car in group B matches the rental request for group C.

in-area transfer enables allocation

Definition: The in-area transfer frees a rental car for the allocation and no rental car would otherwise be available to that allocation.

in-country transfer enables allocation

Definition: The in-country transfer frees a rental car for the allocation and no rental car would otherwise be available to that allocation.

rental car is allocated to rental

Definition: The rental car is nominated to be assigned to the rental at pick-up time.

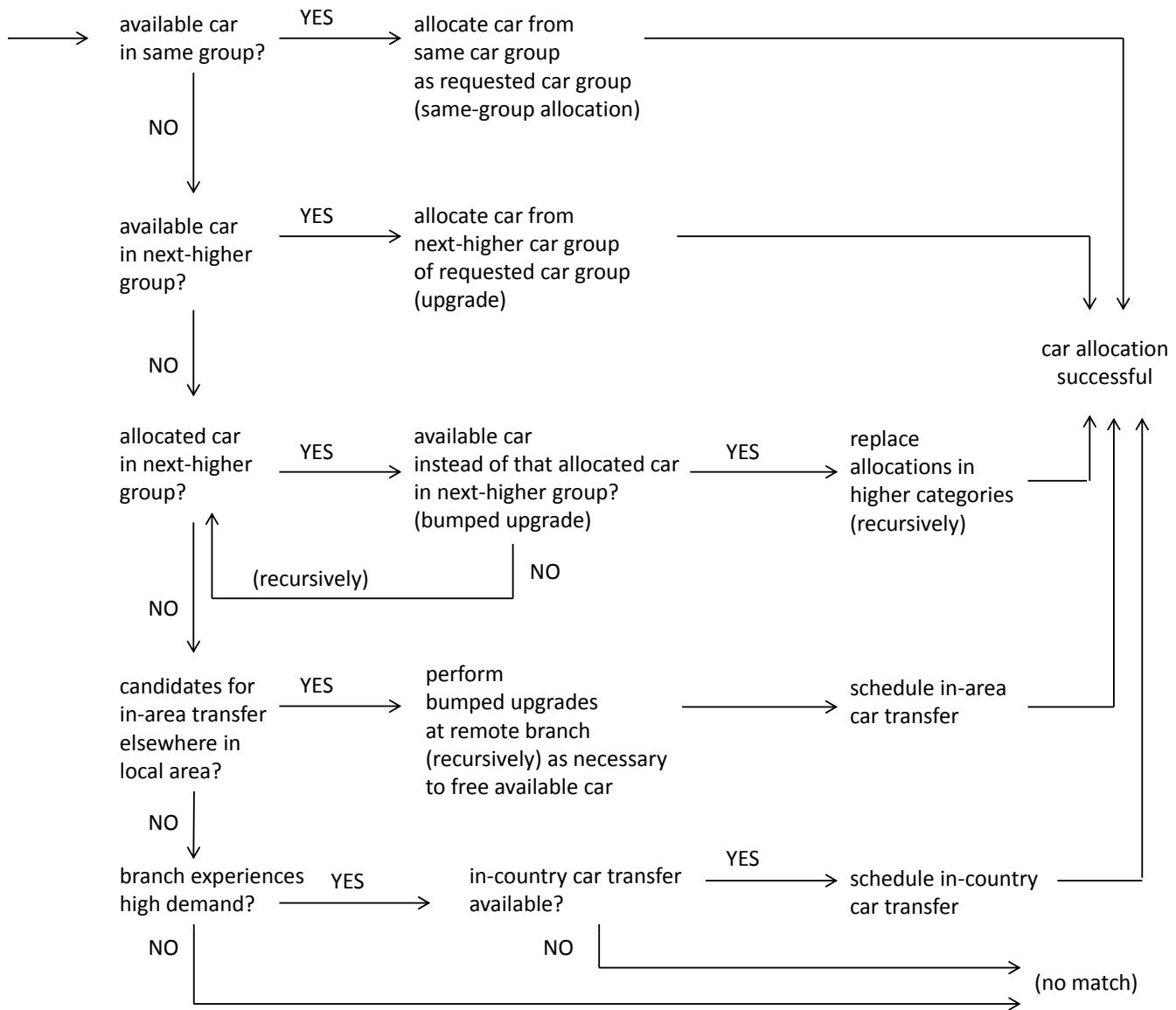
same-group allocation

Definition: Allocation in which the rental car is in the same car group as the car group specified by the rental request of the rental.

upgrade

Definition: Allocation in which the car group of the rental car is the next-higher category of the car group specified by the rental request of the rental.

8.2 Rule Set: Car allocation process rules



Car allocation process rules

Definition: Rules governing the process of allocation.

Note: These rules do not have individual codes. They are provided for process designers.

Necessity: When a rental agreement is reached this must cause exactly one rental to be created.

Necessity: At the time when a rental is created, a rental car must be allocated to that rental.

Necessity: EU-Rent must effectuate as many allocations as possible, even if this means re-shuffling allocated cars among scheduled rentals.

Necessity: Re-shuffling rental cars allocated to open rentals is not allowed.

8.3 Rule Set: Car allocation rules

Car allocation rules

Definition: Rules that determine how available rental cars are allocated to rentals.

Note: Rules in this rule set have a code starting with CA-.

Note: EU-Rent has the legal obligation to allocate a rental car to each rental agreement. Given the fact that availability has been checked prior to the rental being created, this should normally be possible. These rules are not stated as restrictions that define allowed room for action, but rather as directives that prescribe how EU-Rent is to meet this obligation.

CA-000 – Basic car selection principle

Necessity: A rental car may only be allocated to a rental if that rental car is available to the rental proposition of the rental.

Note: CA-000 is a 'design rule' in that it states an underlying principle to be met by each more specific rule. The sole purpose of stating the CA-000 is to provide insight into the design of the rule set.

CA-001 – Same-group allocation

Necessity: A rental must be allocated a rental car that is in the requested car group if such a rental car is available.

CA-002 – Upgrade

Necessity: To a rental must be allocated a rental car that is in the next-higher car group of the requested car group if such a rental car is available and a same-group allocation is not available.

CA-003 – Bumped upgrade

Necessity: A bumped upgrade must be executed if it enables an allocation at the same requested pick-up branch for which otherwise no rental car would be available.

Necessity: A bumped upgrade must be executed if it makes possible a car transfer that enables an allocation at a different requested pick-up branch in the same local area for which otherwise no rental car would be available.

Possibility: There may be a chain reaction of bumped upgrades if this enables an allocation at the lower end of the chain.

CA-004 – Allocation by in-area transfer

Necessity: An in-area transfer must be executed if it enables an allocation for which otherwise no rental car would be available.

CA-005 – Allocation by in-country transfer

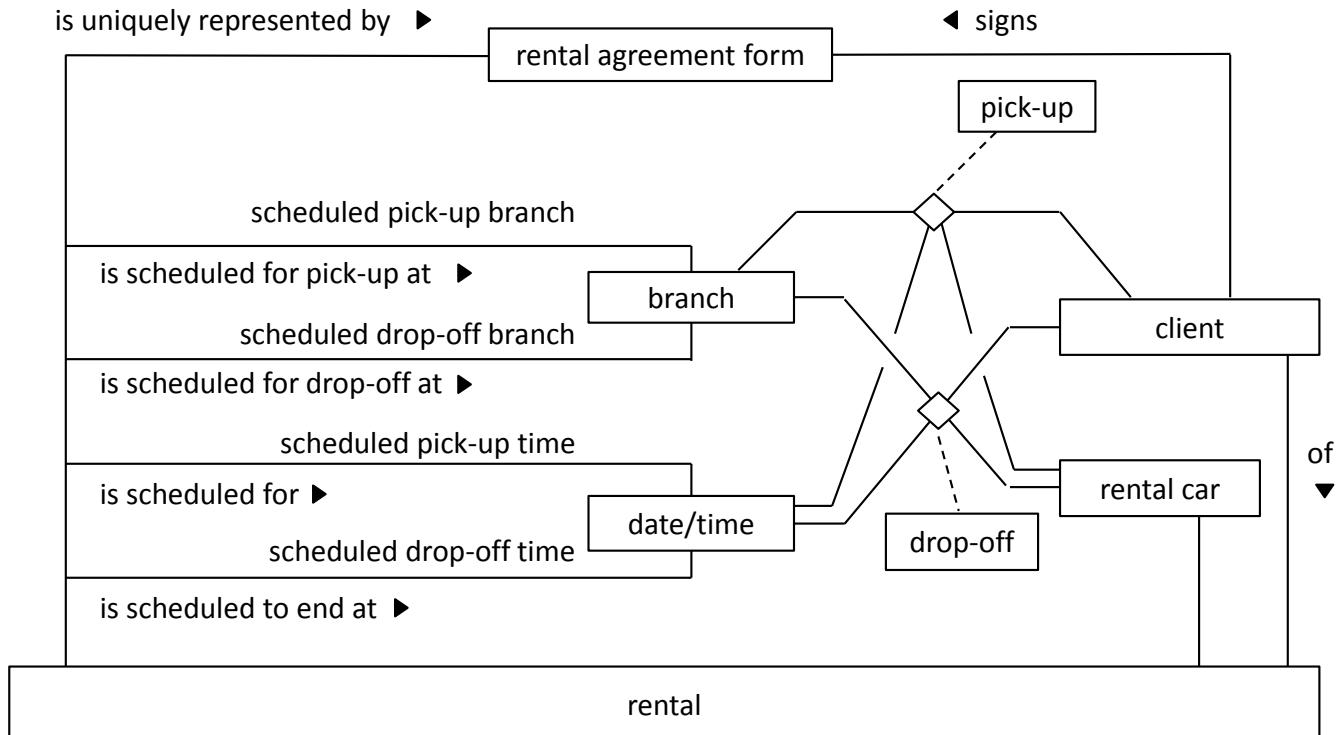
Necessity: An in-country transfer must be executed if it enables an allocation at a branch that experiences high demand at the requested pick-up time and for which otherwise no rental car would be available.

9. Rentals

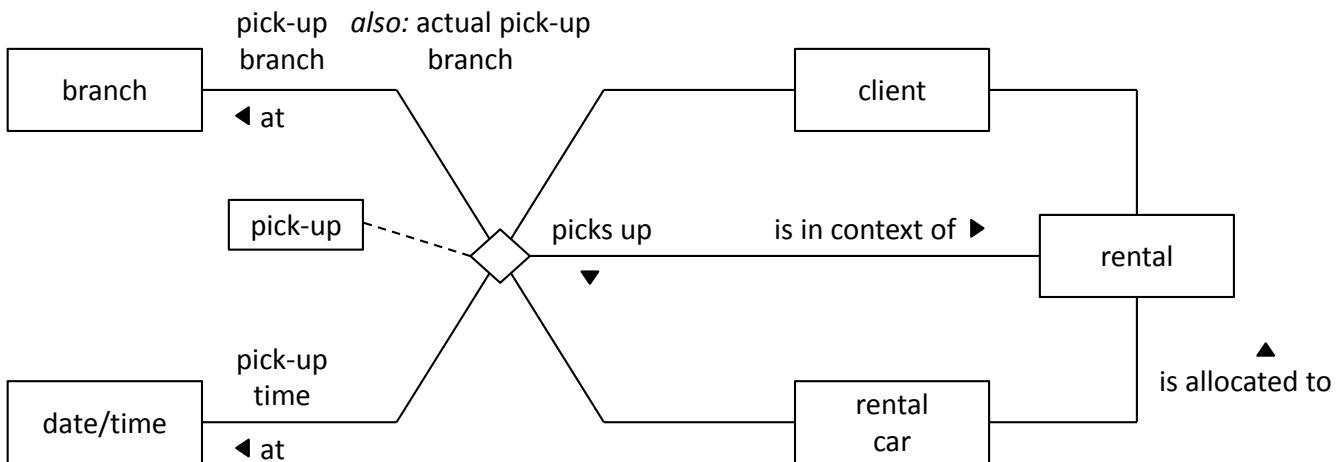
This section demonstrates how noun concepts are ultimately abstractions of *events* that happen, or once happened, at a specific time and a specific place.

This section covers the "happy path" in which rentals happen as scheduled.

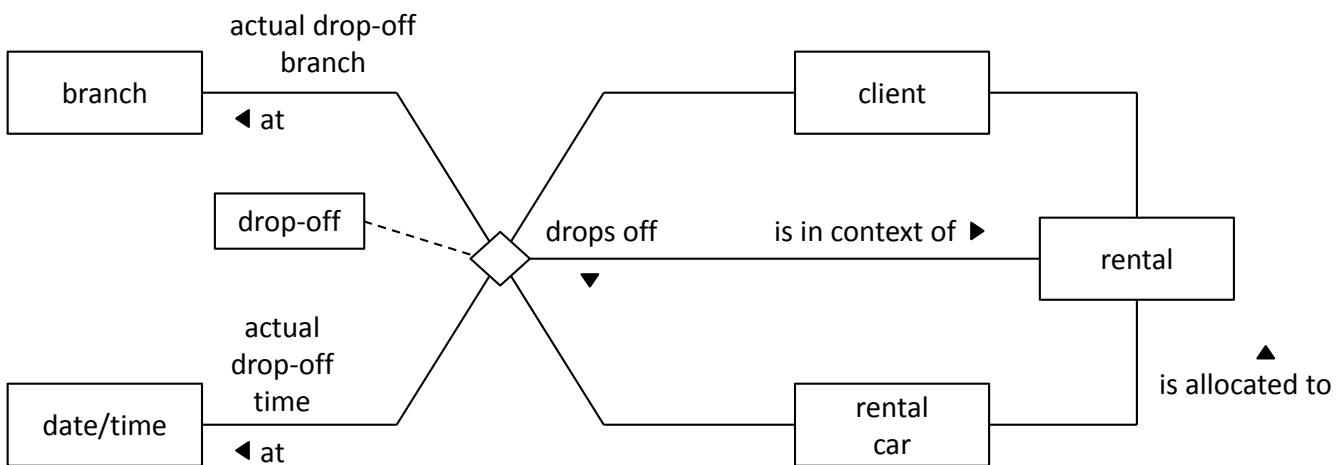
The following diagram covers the client signature, car pick-up, and car drop-off:



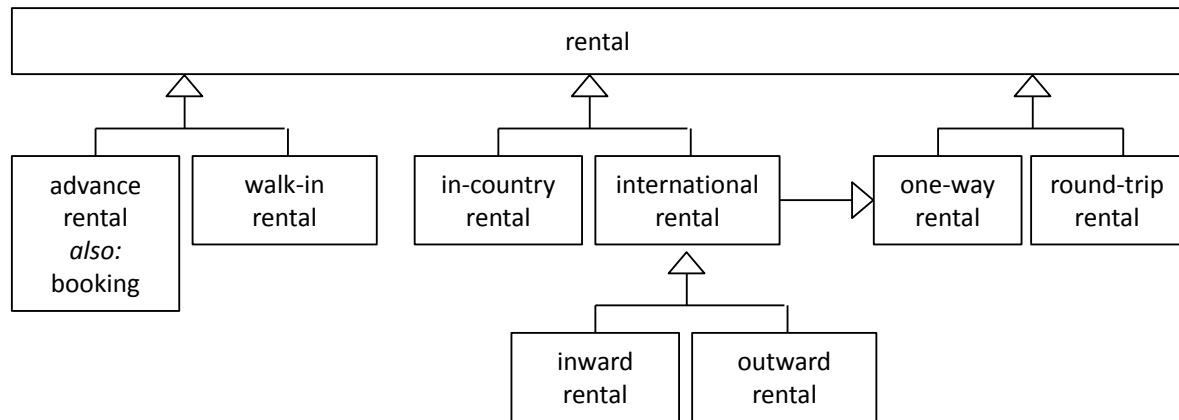
The following diagram details the pick-up event:



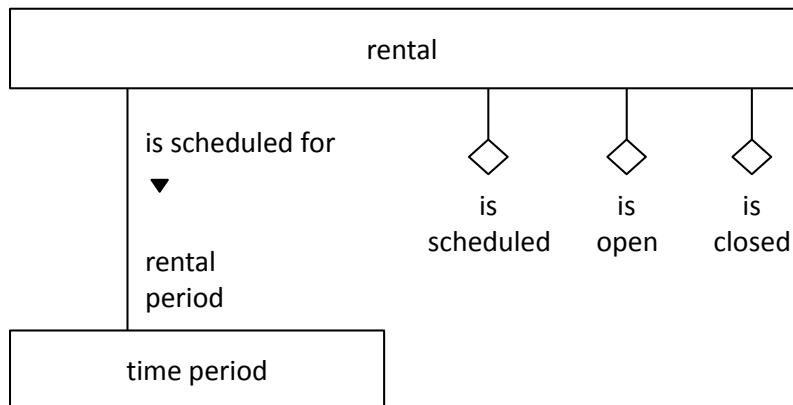
The following diagram details the drop-off event:



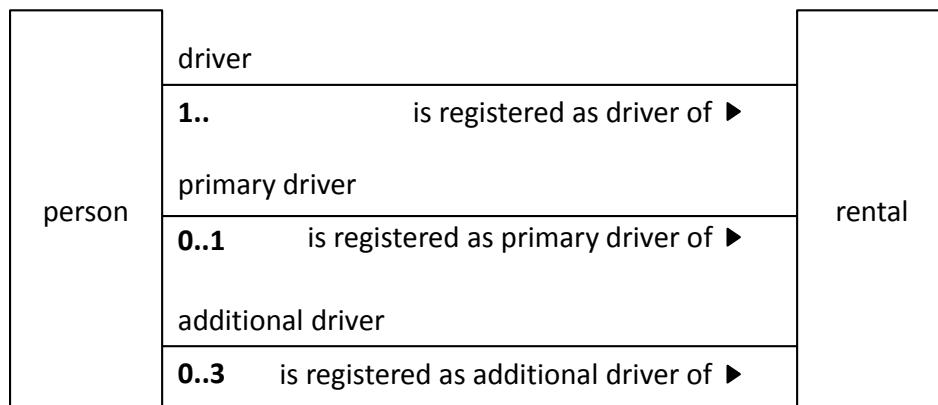
The following diagram covers rental types:



The following diagram covers temporal stages in the lifetime of a rental:



The following diagram covers driver registration for a rental:



actual pick-up branch

See: [pick-up branch](#)

actual drop-off branch

Role in: [client drops off rental car at branch at date/time](#)

actual drop-off time

Role in: [client drops off rental car at branch at date/time](#)

additional driver

Role In: [person is registered as additional driver of rental](#)

advance rental

Definition: [Rental based on a rental agreement of which the agreement date is earlier than the day of the scheduled pick-up time of the rental.](#)

Synonym: [booking](#)

Necessity: [Each rental is either an advance rental or a walk-in rental.](#)

booking

See: [advance rental](#)

client drops off rental car at branch at date/time

Definition: The [person](#), presenting himself or herself at the [branch](#) at the [date/time](#), brings the [rental car](#) to the [branch](#), and is discharged of responsibility for the [rental car](#)

Role: The term '[actual drop-off branch](#)' is used to refer to a [branch](#) in its role of [branch at which the client drops off the rental car at the date/time](#).

Role: The term '[actual drop-off time](#)' is used to refer to a [date/time when a client drops off a rental car at a branch](#).

client picks up rental car at branch at date/time

Definition: The [person](#), presenting himself or herself at the [branch](#) at the [date/time](#), [signs the rental agreement form representing the rental](#), and takes responsibility for the [rental car](#)

Role: The term '[pick-up branch](#)' is used to refer to a [branch](#) in its role of [branch at which the client picks up the rental car at the date/time](#).

Role: The term '[pick-up time](#)' is used to refer to a [date/time when a client picks up a rental car at a](#)

branch.

client signs rental agreement form

drop-off

Definition: The fact that a client drops off a rental car at a branch at a date/time

drop-off is in context of rental

in-country rental

Definition: Rental of which the scheduled pick-up branch and the scheduled drop-off branch are located in the same country.

Necessity: Each rental is either an in-country rental or an international rental.

international rental

Definition: Rental of which the scheduled pick-up branch and the scheduled drop-off branch are located in different countries.

Necessity: A rental is either an in-country rental or an international rental.

Necessity: Each international rental is a one-way rental.

inward rental

Definition: International rental for which the scheduled drop-off branch is located in the country of registration of the car assigned to the rental.

Necessity: An international rental is either an inward rental or an outward rental.

one-way rental

Definition: Rental of which the scheduled drop-off branch is different from the scheduled pick-up branch.

Necessity: Each rental is either a one-way rental or a round-trip rental.

outward rental

Definition: International rental for which the scheduled pick-up branch is located in the country of registration of the car assigned to the rental.

Necessity: An international rental is either an inward rental or an outward rental.

person is registered as additional driver of rental

Role: The term additional driver is used to designate a person in his or her role of being registered as

additional driver of a rental.

Synonymous Form: rental has additional driver

Necessity: A person who is registered as additional driver of a rental must be considered a person who is registered as driver of that rental.

Necessity: At most three persons may be registered as additional driver of each rental.

person is registered as driver of rental

Role: The term driver is used to designate a person in his or her role of *being registered as driver of a rental*.

Synonymous Form: rental has driver

Necessity: Persons may not be registered as driver of a rental that is open or closed.

Necessity: Only accredited drivers may be registered as driver of a rental.

Necessity: Barred drivers may not be registered as driver of a rental.

person is registered as primary driver of rental

Role: The term primary driver is used to designate a person in his or her role of *being registered as primary driver of a rental*.

Synonymous Form: rental has primary driver

Necessity: A person who is registered as primary driver of a rental must be considered a person who is registered as driver of that rental.

Necessity: At most one person must be registered as primary driver of each rental.

Necessity: A rental may only be opened if a person is registered as primary driver of that rental.

Note: Unlike the registration of additional drivers (if any), the registration of the primary driver does not imply any additional driver charge.

pick-up

Definition: The fact that a client picks up a rental car at a branch at a date/time

pick-up branch

Role in: client picks up rental car at branch at date/time

Synonym: actual pick-up branch

Note: The only way for a client to change the pick-up branch of a rental is to cancel the rental and submit a new rental request.

pick-up *is in context of* **rental**

primary driver

Role In: person *is registered as primary driver of* **rental**

rental agreement form

rental has additional driver

See: person *is registered as additional driver of* **rental**

rental has driver

See: person *is registered as driver of* **rental**

rental has primary driver

See: person *is registered as primary driver of* **rental**

rental has late show

rental is closed

Definition: **The client has dropped off the rental car allocated to the rental.**

Necessity: **No closed rental is open.**

rental is open

Definition: **The client has picked up the rental car allocated to the rental, and has not yet dropped off that rental car.**

Necessity: **No open rental is scheduled.**

Necessity: **No open rental is closed.**

rental is scheduled

Definition: **The rental is based on a rental agreement but a pick-up has not occurred in the context of the rental.**

Necessity: **No scheduled rental is open.**

rental is scheduled for date/time

Role: The term 'scheduled pick-up time' is used to refer to the date/time when a **rental** *is scheduled*.

rental is scheduled for drop-off at branch

Role: The term 'scheduled drop-off branch' is used to refer to a branch in its role as branch where a rental is scheduled for drop-off.

rental is scheduled for pick-up at branch

Role: The term 'scheduled pick-up branch' is used to refer to a branch in its role as branch where a rental is scheduled for pick-up.

rental is scheduled for time period

Role: The term 'rental period' is used to refer to the time period that a rental is scheduled for.

rental is scheduled to end at date/time

Role: The term 'scheduled drop-off time' is used to refer to the date/time when a rental is scheduled to end.

Necessity: A rental must be scheduled to end at the date/time that is the requested pick-up time plus the requested rental period of the rental request of that rental.

rental is uniquely represented by rental agreement form

rental period

Role in: rental is scheduled for time period

Role in: time period implies RTU

round-trip rental

Definition: Rental of which the scheduled drop-off branch is the same as the scheduled pick-up branch.

Necessity: Each rental is either a one-way rental or a round-trip rental.

scheduled drop-off branch

Role in: rental is scheduled for drop-off at branch.

scheduled drop-off time

Role in: rental is scheduled to end at date/time.

scheduled pick-up branch

Role in: rental is scheduled for pick-up at branch.

scheduled pick-up time

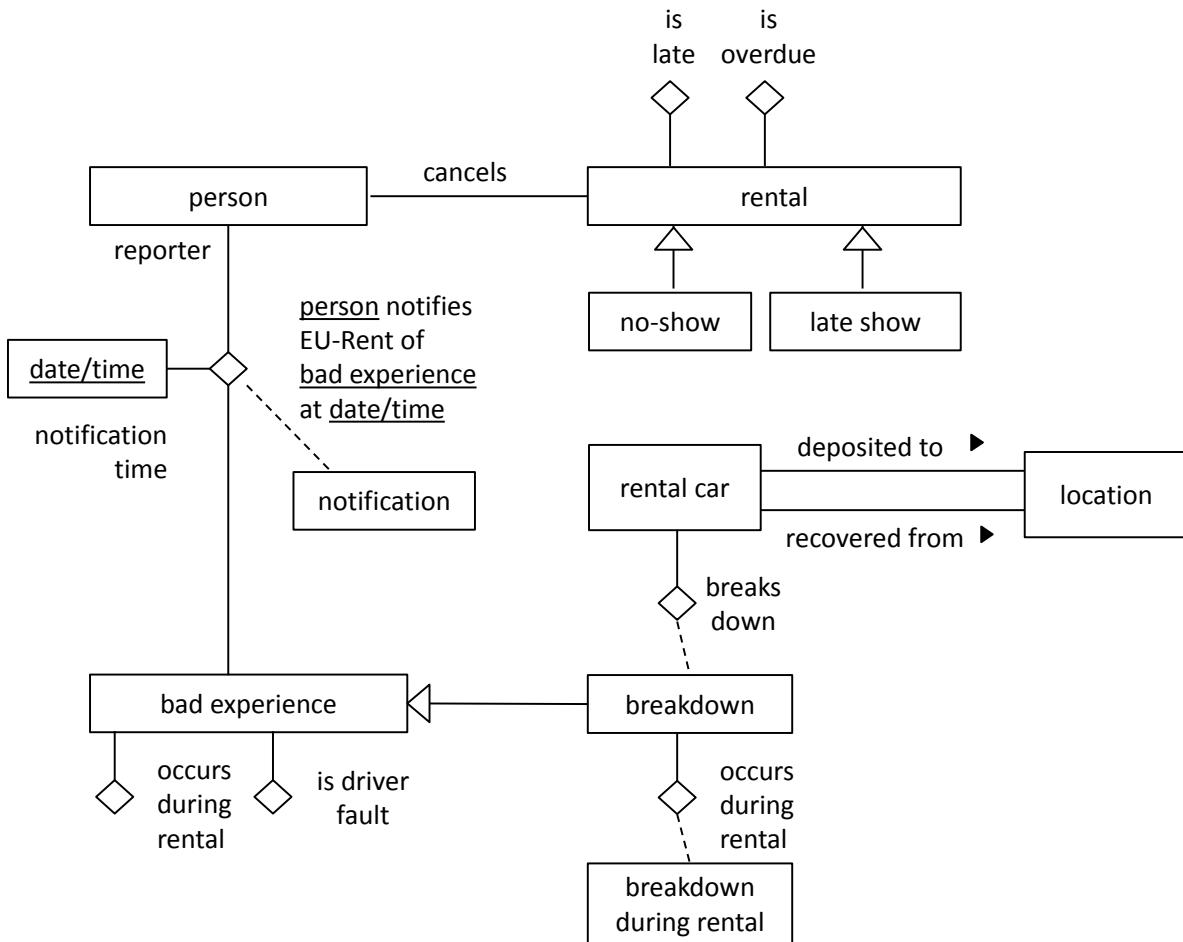
Role in: rental is scheduled for date/time.

walk-in rental

Definition: Rental based on a rental agreement of which the agreement date is on the same day as the date/time that the rental is scheduled for.

Necessity: Each rental is either an advance rental or a walk-in rental.

10. Alterations, cancellations and rental problems



bad experience

Definition: Undesirable event that occurs during a rental or a car transfer.

General concept: car movement reason

Example: Speeding offence.

Example: Unpaid parking fine.

Example: Damage to car caused by accident or careless driving.

bad experience is driver fault

Definition: The driver can be held legally responsible for the bad experience.

Necessity: A bad experience that *is a driver fault* is a bad experience that *occurs during rental*.

bad experience occurs during rental

breakdown

Definition: The bad experience that a rental car *breaks down*.

breakdown during rental

Definition: A breakdown that *occurs during rental*.

late show

Definition: Rental *in the context of which a pick-up occurs on the same day, but at a later date/time than the scheduled pick-up time of the rental*.

Necessity: No late show *is a no-show*.

no-show

Definition: Rental *in the context of which no pick-up occurs on the same day as the scheduled pick-up time of the rental*.

Necessity: No no-show *is a late show*.

notification

Definition: The fact that a person *notifies EU-Rent of a bad experience at a date/time*.

notification time

Role in: person *notifies EU-Rent of bad experience at date/time*

person cancels rental

Necessity: A rental *may be cancelled only by the client of that rental*.

person notifies EU-Rent of bad experience at date/time

- Role: The term reporter is used to designate the person who *notifies EU-Rent of a bad experience*.
- Role: The term notification time is used to designate the date/time when *EU-Rent was notified of a bad experience*.

rental car breaks down

rental car is deposited to location

Definition: The rental car is taken to the location as an unscheduled emergency measure because of a bad experience.

rental car is recovered from location

Definition: The rental car is taken from the location where it *was deposited* to an EU-Rent site.

rental is late

Definition: *No drop-off has occurred in the context of the rental and the current date/time is later than the scheduled drop-off time of the rental, but is on the same day as that scheduled drop-off time.*

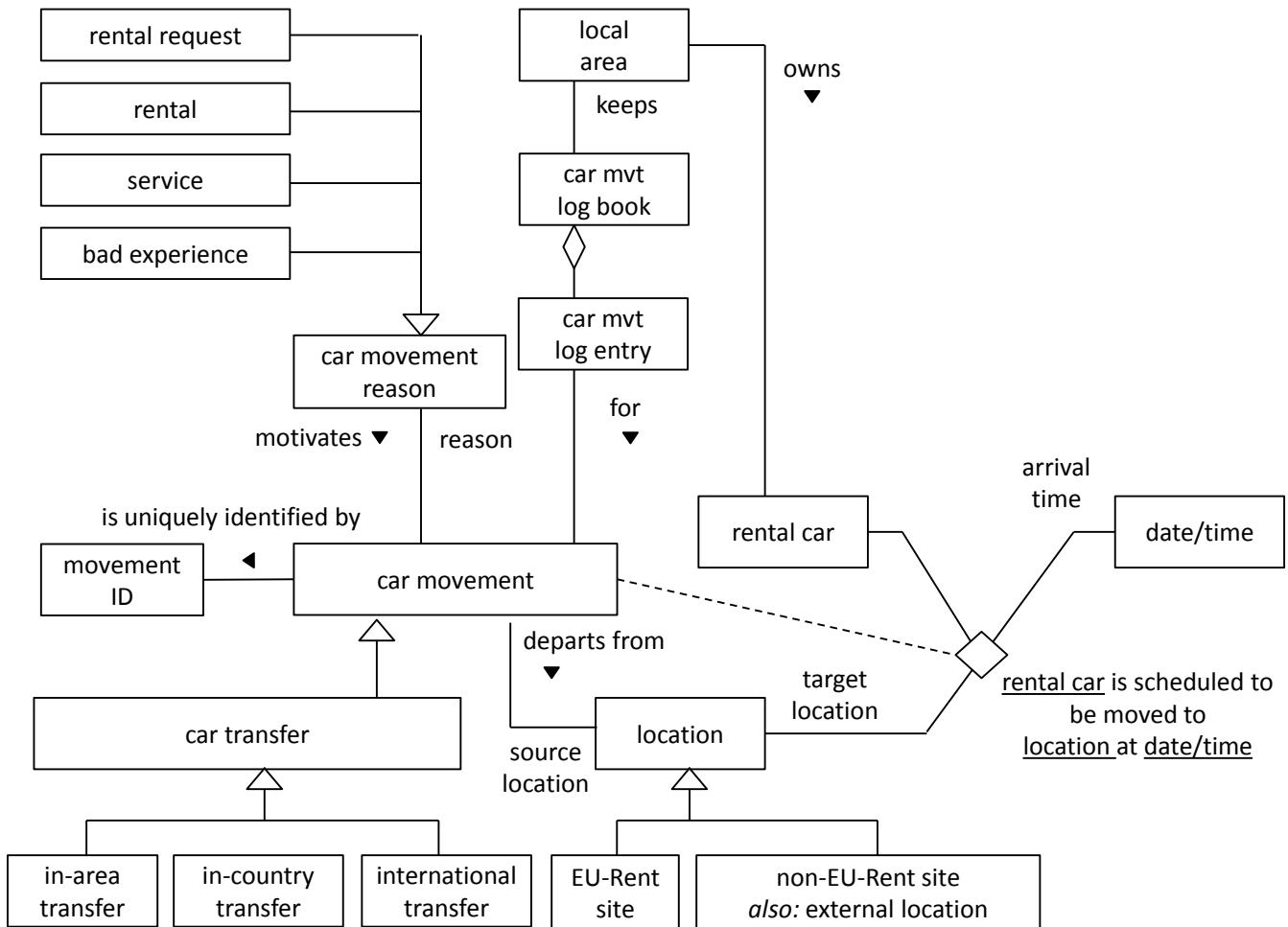
rental is overdue

Definition: *No drop-off occurs in the context of the rental on the same day as the scheduled drop-off time of the rental.*

reporter

Role in: person notifies EU-Rent of bad experience at date/time

11. Car movements



arrival time

Role in: rental car is scheduled to be moved to location at date/time

car movement

Definition: The fact that a rental car is moved, or is scheduled to be moved, to a specific location at a specific arrival time for a specific reason.

Definition: **The fact that a rental car is scheduled to be moved to a target location at an arrival time.**

Reference Scheme: movement ID

Role: The term arrival time is used to designate the date/time at which a rental car is displaced to a location.

Role: The term target location is used to designate the location to which a rental car is displaced at a date/time.

Possibility: A rental car may be displaced to a target location that is the same as the location where the car

movement departed from. This occurs when the car movement reason is a round-trip rental.

car movement departs from location

- Definition: The rental car of the car movement is moved from the location to the target location of the car movement.
- Role: The term source location is used to refer to a location in its role of being the location that a car movement departs from.
- Necessity: **The source location of a car movement is the target location of the preceding car movement for the same rental car.**

car movement has car movement reason

Synonymous form: car movement reason motivates car movement

Role: The term 'reason' is used to refer to the car movement reason that a car movement has.

car movement is in-area

Definition: Car movement of which the source location is included in the same local area as the target location.

car movement is in-country

Definition: Car movement of which the source location is in the same country, but not in the same local area, as the target location.

car movement is international

Definition: Car movement of which the source location is in a different country than the target location.

car movement is uniquely identified by movement ID

Note: A given car could be moved more than once between the same two branches, perhaps even on the same day. Movement-id is needed to provide a reliable reference scheme.

car movement log entry

Necessity: A written or digital record of a specific car movement.

car movement log entry *is for car movement*

car movement log book

car movement log book *includes car movement log entry*

car movement reason

Necessity: A car movement reason must be exactly one of the following:

- a rental request.
- a rental.
- a service.
- a bad experience.

car movement reason *motivates car movement*

Synonymous car movement has car movement reason
form:

car transfer

Definition: The fact that a rental car is moved to some branch by a member of staff of EU-Rent to satisfy a specific rental request.

Definition: A car movement motivated by a rental request.

Necessity: The target location of a car transfer is a branch.

Necessity: The source location of a car transfer is not the same location as its target location.

Necessity: The rental car of a car transfer must be of a car model in the car group that is specified by the rental request that motivates the car transfer.

Necessity: Each car transfer is exactly one of the following:

- in-area transfer.
- in-country transfer.
- international transfer.

Possibility: The rental request motivates the car transfer, but the corresponding rental may eventually be allocated a different rental car than the rental car moved in the car transfer.

Note: A car transfer meets the business requirement that a car of a given group has to be moved between branches (“we need to move a full-size car from the London City branch to the Heathrow Airport branch”).

EU-Rent site

Definition: A location where EU-Rent does business.

external location

See: [non-EU-Rent site](#)

in-area transfer

Definition: [Car transfer](#) of which the [source location](#) and [target location](#) [are branches in the same local area.](#)

in-country transfer

Definition: [Car transfer](#) of which the [source location](#) and [target location](#) [are branches in the same country but not in the same local area.](#)

international transfer

Definition: [Car transfer](#) of which the [source location](#) and [target location](#) [are branches in different countries.](#)

local area keeps car movement log book

Necessity: [A local area must keep a car movement log book that includes a car movement log entry for each car movement of each rental car that the local area owns.](#)

location

Definition: Any geographical position, whether identified by an address, a set of GPS coordinates, or otherwise, that a rental car is considered to be located at.

movement ID

Definition: ID number [that](#) uniquely identifies [a car movement](#)

Note: A given car could be moved more than once between the same two branches, perhaps even on the same day. Movement ID is needed to provide a reliable reference scheme.

non-EU-Rent site

Definition: [A location that is not an EU-Rent site.](#)

Synonym: [external location](#)

reason

Role In: [car movement has car movement reason](#)

rental car is scheduled to be moved to location at date/time

- Role: The term 'arrival time' is used to refer to a date/time when a rental car is scheduled to be moved to a location.
- Role: The term 'target location' is used to refer to a location where a rental car is scheduled to be moved to at a date/time.

source location

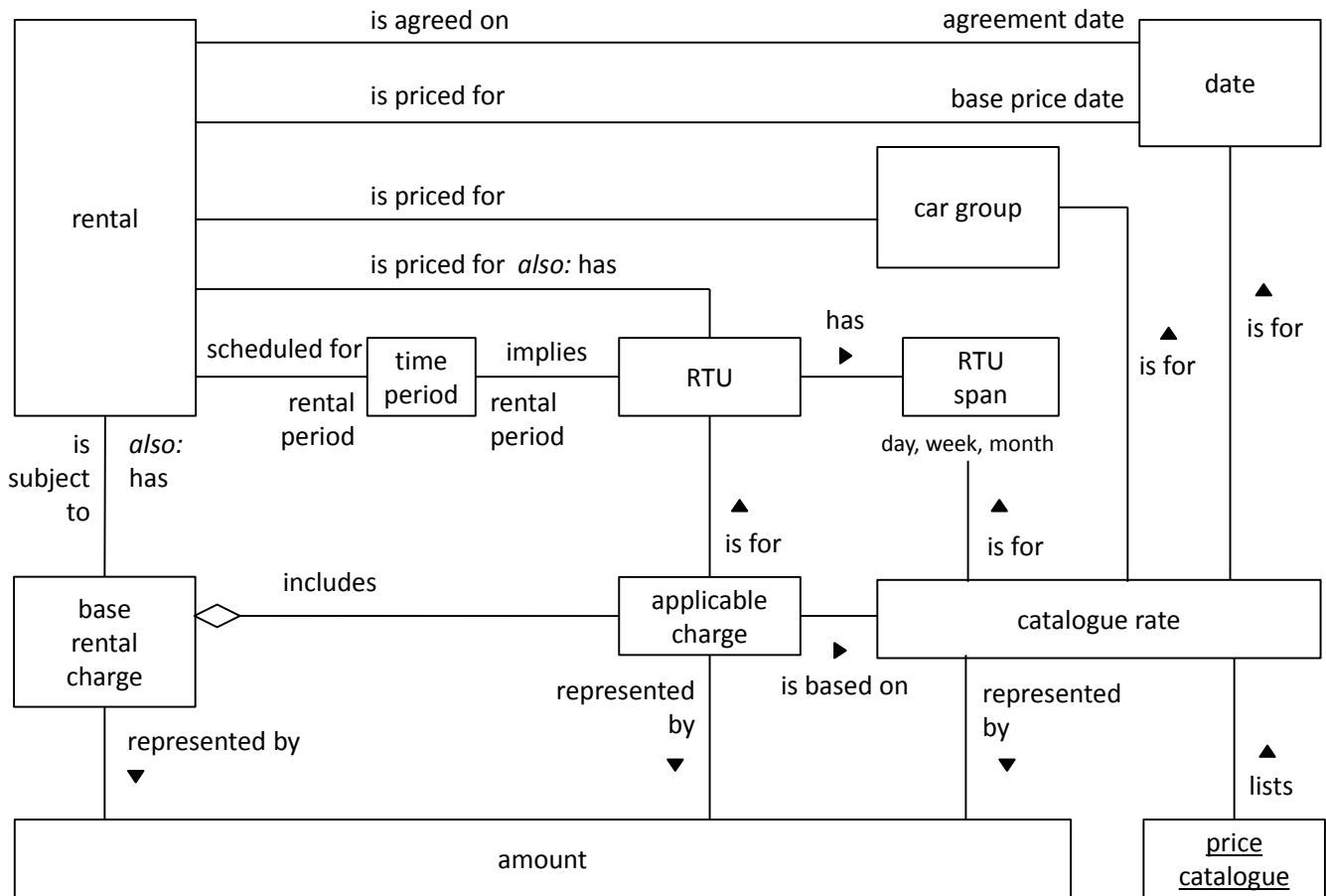
Role In: car movement departs from location

target location

Role in: rental car is scheduled to be moved to location at date/time

12. Rental pricing

12.1 Base rental charge



applicable charge

Definition: A charge for a specific RTU that is a component of a rental's base rental charge.

Note: [Rental pricing rules](#) determine how the applicable charge of a given RTU is calculated.

applicable charge is based on catalogue rate

applicable charge is for RTU

applicable charge is represented by amount

base price date

Role in: [rental is priced for date](#)

base rental charge

Definition: The amount that the client of a rental is charged for on the basis of catalogue rates, before any additional charges or special offers are taken into account.

base rental charge includes applicable charge

Necessity: A base rental charge includes the applicable charges for all RTUs of the rental that is subject to the base rental charge.

base rental charge is represented by amount

catalogue rate

Definition: A pre-defined charge applicable to the rental of a car of a specific car group during a specific RTU span on a specific date.

Reference scheme: The combination of the date that the catalogue rate is for, the car group that it is for, and the RTU span that it is for.

catalogue rate is for car group

catalogue rate is for date

catalogue rate is for RTU span

catalogue rate is represented by amount

price catalogue

Role: The list of catalogue rates that EU-Rent applies to rentals over time.

Necessity: The price catalogue must list exactly one catalogue rate for each combination of date, car group and RTU span.

Example: An example of a price catalogue is in Annex C of this document.

Note: The price catalogue is a technical resource that has a different presentation from sales catalogues presented to clients.

price catalogue lists catalogue rate

rental has base rental charge

See: rental is subject to base rental charge

rental has RTU

See: [rental is priced for RTU](#)

rental is agreed on date

Role: The term 'agreement date' is used to refer to a date when a rental was agreed.

Necessity: The agreement date of a rental is the agreement date of the rental agreement that the rental is based on.

rental is priced for date

Role: The term 'base price date' is used to refer to a date that a rental is priced for.

Necessity: The base price date of a rental is the agreement date of that rental.

rental is priced for car group

Necessity: A rental must be priced for the car group that is the requested car group of the rental request underlying the rental.

rental is priced for RTU

Definition: The RTU is used to determine the base rental charge of the rental.

Synonym: [rental has RTU](#)

Necessity: A rental must be priced for each RTU that is implied in the rental period that the rental is scheduled for.

rental is subject to base rental charge

Synonym: [rental has base rental charge](#)

Rental Time Unit

See: [RTU](#)

RTU

Definition: A time span that a rental period is considered to be made up of for the purpose of determining the base rental charges.

Synonym: [Rental Time Unit](#)

Necessity: Each RTU is represented by a sequence of days.

Note: A sequence of days that represents an RTU is a multiple of 24 hours. This corresponds to the rule that the rental period that implies the RTU is a multiple of 24 hours.

[RTU has RTU span](#)

[RTU is represented by sequence of days](#)

[RTU span](#)

Definition: A standard duration measured in days that RTUs are considered to have for the purpose of determining base rental charges.

General concept: duration

Example: 1

Example: 3

Example: 7

Example: 28

Note: An RTU span of one day is represented by the number 1.

Note: An RTU span of one week is represented by the number 7.

Note: An RTU span of one month is normalized as a sequence of 28 days and represented by the number 28.

[RTU span is measured in day](#)

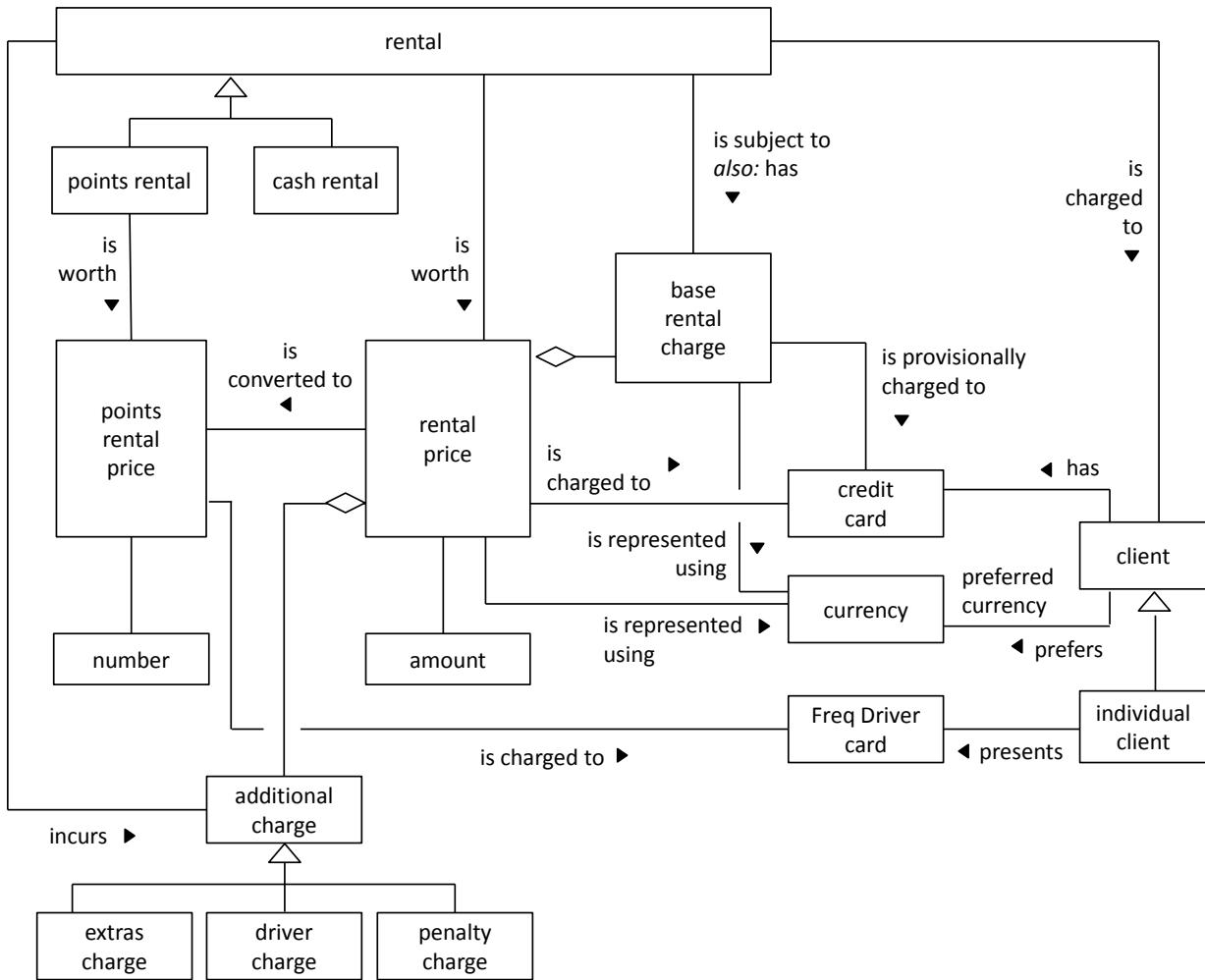
[RTU span is represented by integer](#)

[time period implies RTU](#)

Role: The term 'rental period' is used to refer to a time period in its role of *implying* an RTU.

Note: RTU Derivation Rules determine how a rental period must be considered to imply an RTU.

12.2 Rental price and payment mode



additional charge

Necessity: An additional charge is either an extras charge or a driver charge or a penalty charge.

base rental charge is provisionally charged to credit card

Necessity: The base rental charge of a rental must be provisionally charged to the credit card of the client of the rental at the time of the rental agreement that the rental is based on.

base rental charge is represented using currency

Necessity: The base rental charge of a rental must be represented using the preferred currency of the client of the rental.

cash rental

Definition: A rental that the client wishes to pay for in money.

Necessity: **Each rental is either a cash rental or a points rental.**

client has credit card

client prefers currency

Definition: The client wishes to be charged in the currency rather than in another currency.

Role: The term 'preferred currency' is used to refer to a currency in its role of currency preferred by a client.

driver charge

Definition: Additional charge that is for additional drivers (if any).

extras charge

Definition: Additional charge that is for an optional extra.

penalty charge

Definition: Additional charge that is for non-compliance with the terms of a rental.

points rental

Definition: A rental that the client wishes to pay for with points accumulated on his or her Frequent Driver card.

Necessity: **Each rental is either a cash rental or a points rental.**

points rental is worth points rental price

points rental price

points rental price is charged to Frequent Driver card

Necessity: **The points payment of a points rental must be charged to the Frequent Driver card of the client of the rental at the time the rental is closed.**

points rental price is represented by number

preferred currency

Role in: **client prefers currency**

rental incurs additional charge

rental is charged to client

Necessity: The client who is charged for a rental must be the client who submitted the rental request of the rental.

rental is worth rental price

rental price

rental price includes additional charge

rental price includes base rental charge

rental price is charged to credit card

Necessity: The cash rental price of a cash rental must be charged to the credit card of the client of the rental at the time the rental is closed.

rental price is converted to points rental price

Necessity: The rental price that a points rental is worth must be converted to the points rental price that that points rental is worth at the time the rental is closed.

rental price is represented by amount

rental price is represented using currency

Necessity: The rental price of a rental must be represented using the preferred currency of the client of the rental.

12. 3 Price catalogue sample

Operating company: EU-Rent DE

Business currency: EUR

Price catalogue effective from: 20-DEC-2014

Car group	RTU (in number of days)		
	1	7	28
A	35,00	235,00	940,00
B	38,50	241,50	1023,00
C	40,50	265,00	1065,50
D	44,00	289,60	1155,70
E	47,20	301,70	1241,30

Price catalogue effective from: 01-JAN-2015

Car group	RTU (in number of days)			
	1	3	7	28
A	35,50	104,40	237,00	951,00
B	39,50	109,75	243,50	1026,30
C	41,50	118,10	267,00	1068,60
D	45,50	126,60	290,40	1161,80
E	47,80	135,10	303,05	1243,00

12.4 Rule Set: Rental pricing rules

Rental pricing rules

Definition: Set of rules that govern the calculation of a rental's base rental charge.

Lowest-Charge RTU Charge

Definition: The applicable charge for an RTU must be set to the catalogue rate that is:

- for the RTU span of the RTU,
- for the car group that the rental is priced for, and
- for the base price date within the RTU that has the lowest catalogue rate.

Rule set: Rental pricing rules

Example 1: A rental period running from 1 to 10 August of some year implies an RTU span of a week (7 days) from 1 to 7 August inclusive. For this entire RTU span and the car group that the rental is priced for, the catalogue rate is 135,00 Euro. The applicable charge for the entire RTU is 135,00 Euro.

Example 2: A rental period running from 1 to 10 August of some year implies an RTU span of a week (7 days) from 1 to 7 August inclusive. For this RTU span and the car group that the rental is priced for, the catalogue rate on August 1 is 135,00 Euro. On August 3, the rate is raised to 137,50 Euro. The applicable charge for the entire RTU is 135,00 Euro.

Example 3: A rental period running from 1 to 10 August of some year implies an RTU span of a week (7 days) from 1 to 7 August inclusive. For this RTU span and the car group that the rental is priced for, the catalogue rate on August 1 is 135,00 Euro. On August 3, the rate is lowered to 132,50 Euro. The applicable charge for the entire RTU is 132,50 Euro.

RTU Derivation

Definition: A given rental period is considered to *imply* RTUs of the greatest of the RTU spans distinguished by EU-Rent on the base price date of the rental as many times as possible, distinguishing the greatest RTU spans first in the order of time.

Rule set: Rental pricing rules

Example 1: The duration of a rental period is 20 days. On the base price date, EU-Rent distinguishes three RTU spans: a month, a week and a day. The rental period implies 8 RTUs: 2 weeks counting from the base price date of the rental, followed by 6 individual days.

Example 2: The duration of a rental period is 2 months and 15 days. On the first day, EU-Rent distinguishes three RTU spans: a month, a week and a day. The rental period implies 5 RTUs: 2 months counting from the base price date of the rental, followed by 2 weeks, followed by 1 day.

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