



Exam DEMO Professional  
EXAMPLE EXAM

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**Assignment 1 (10 points)**

Explain the composition axiom. Take the rental end and rental payment in the Funride case (assignment 6) as the example for illustrating your answer.

**Assignment 2 (10 points)**

Draw the cancellation pattern of a request. Illustrate it with the cancellation of a car rental by a renter in the Funride case (assignment 6).



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### **Assignment 3 (10 points)**

Characterize the next changes in the Funride case (see assignment 6) as primarily ontological, infological or datalogical:

The possibility to book car rentals via the web site of Funride.

The possibility to take an insurance policy from Funride.

The possibility to see on the web site of Funride which cars are available on a particular date.

The possibility to conclude a long-term contract, which allows one to rent 'for free' 10 times a year.

Applying rental tariff reductions, e.g., depending on the number of times a customer has rented a car in the past 24 months.

### **Assignment 4 (10 points)**

Explain the design process of a system as a series of alternating analysis and synthesis steps. Which kind of step (analysis or synthesis) is the most creative and why?



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**Assignment 5 (10 points)**

In the book Enterprise Ontology you can read that the transition space of the production world is fully determined by the the transition space of the coordination world. Clarify this statement.



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## Assignment 6 (50 points)

The company Funride rents cars, operating from geographically dispersed branches. Many cities have a branch, some even several, and there are also branches located near airports and railway stations. The cars of Funride are divided in car groups. A car group may contain several types of car (brands and models); all cars in a car group have the same rental tariff per day.

Somebody who concludes a rental contract with Funride is called the renter of the rental. There is also somebody the driver; this person may but need not be the renter.

Some of the data that have to be filled out on the contract form are the identification data of the renter and the driver, the desired car group, the duration of the rental (a number of days), the branch where the car will be picked up, the branch where the car will be returned, and the starting date of the contract. The return branch may but need not be the same as the pick-up branch.

For a walk-in customer the starting date is usually the same date as on which the contract is established. However, one can also book rentals in advance. Then the starting date is some future date.

At the starting date of a rental, a particular car is allocated (you do not have to model this). In order to drive the car, the driver has to pick it up.

After the car of a rental has been dropped-off at some branch, the rental can be ended. This implies that the incurred charge must be paid. The actual rental charge can consist of several elements. First, there is the basic charge amounting to the contracted duration times the tariff per day. Then there may be a penalty charge for exceeding this duration. It amounts to the number of extra days times the late return penalty tariff. Lastly, the car may have been dropped-off at another branch than the contracted return branch. In that case a location penalty charge is added.

### Sub assignments

1. Produce the Actor Transaction Diagram and the Transaction Result Table of the Funride case, based on the information that is provided above. **(20 points)**
2. Produce the State Model of the Funride case, based on the information that is provided above. **(20 points)**
3. Produce the Organization Construction Diagram of the Funride case, based on the results so far and the information that is provided above. **(10 points)**



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### **Assignment 1 (10 points)**

Explain the composition axiom. Take the rental end and rental payment in the Funride case (assignment 6) as the example for illustrating your answer.

*< the composition axiom can be found in the book Enterprise Ontology, Chap. 11 >*

*The rental payment fact (R03) is a component of the rental end fact (R02). Consequently, the transaction kind T03 is enclosed in , the transaction kind T02.*

### **Assignment 2 (10 points)**

Draw the cancellation pattern of a request. Illustrate it with the cancellation of a car rental by a renter in the Funride case (assignment 6).

*< the cancellation pattern can be found in the book Enterprise Ontology, Chap. 10 >*

*The cancellation of a car rental by the renter means cancelling the request in the corresponding instance of T01. The response by Funride (actor A01) is to allow this, provided that the cancellation is done in time. This is dependent on the business rules that Funride applies.*



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Applying rental tariff reductions, e.g., depending on the number of times a customer has rented a car in the past 24 months.

*In the order listed, the changes must be characterized as follows:*

*Datalogical; this change only regards another way of communicating.*

*Ontological; a new service (transaction) is being offered.*

*Info-logical; this change regards the making available of new information to the customers.*

*Ontological; this is a new transaction kind with a new transaction result.*

*Info-logical; this is a matter of calculation.*

### **Assignment 4 (10 points)**

Explain the design process of a system as a series of alternating analysis and synthesis steps. Which kind of step (analysis or synthesis) is the most creative and why?

*< this can be found in the book Enterprise Ontology, Chap. 8 >*



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*< this can be found in the book Enterprise Ontology, Chap. 15 >*



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**Analysis**

*Apparently, the unit of service of Funride is the provision of a car for a number of days. It is called a (car) rental. The notion of car rental is a location-time notion, like e.g., lending a book from a library or a seat in a theatre. Basically, it represents the right to use a location-bound service for some time. Therefore, it has to be started and to be ended explicitly. So, we identify two transaction kinds, which we will call T01 (rental start) and T02 (rental end). The executor of T01 is A01 (rental starter) and the executor of T02 is A02 (rental ender). In the period between the creation time of R01 (rental R has been started) and the creation time of R02 (rental R has been ended) the rental is alive. It means that the renter has the right to let the driver drive the car.*

*We introduce the (external) composite actor role CA01 (renter) as the initiator of T01 and T02.*

*The picking up and dropping off of a car are two separate transactions. Let us call them T04 and T05. The results (R04 and R05) are respectively "the car of rental R has been picked-up" and "the car of rental R has been dropped-off". The initiator of both transaction kinds is A01, and the executor is the driver; let us introduce for this the external composite actor role CA02.*

*Booking in advance means only that the requested creation time of the transaction result (R01) is some date in the future (the earliest one being today).*

*The fifth transaction we identify is the payment for a rental. The initiator obviously is A02 and as the executor we take CA01 (renter). Note that the authority of A01 to accept the dropping-off of a car may be delegated to the fulfiller of A02. Normally this will be the case.*



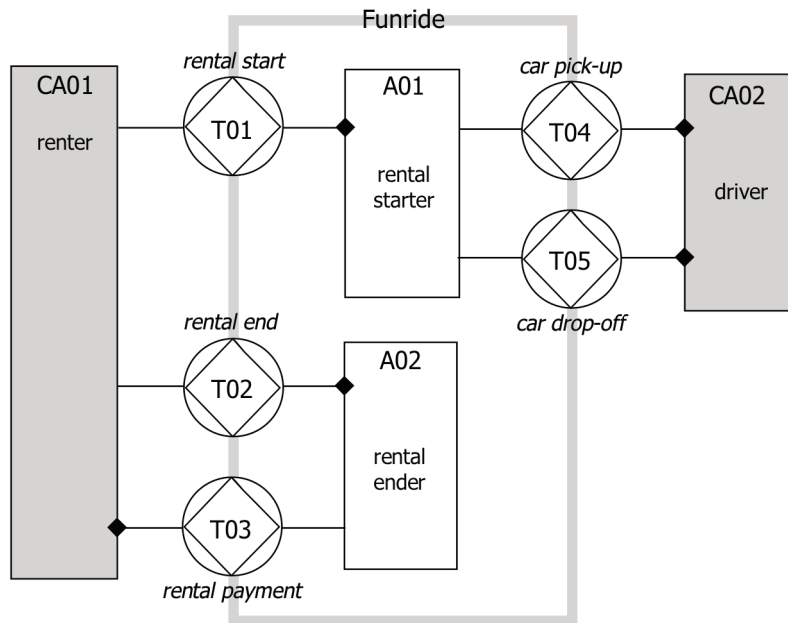
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## The Actor Transaction Diagram



## The Transaction Result Table

Transaction type	Transaction result
T01 rental start	R01 <i>rental R has been started</i>
T02 rental end	R02 <i>rental R has been ended</i>
T03 rental payment	R03 <i>rental R has been paid</i>
T04 car pick-up	R04 <i>the car of rental R has been picked-up</i>
T05 car drop-off	R05 <i>the car of rental R has been dropped-off</i>



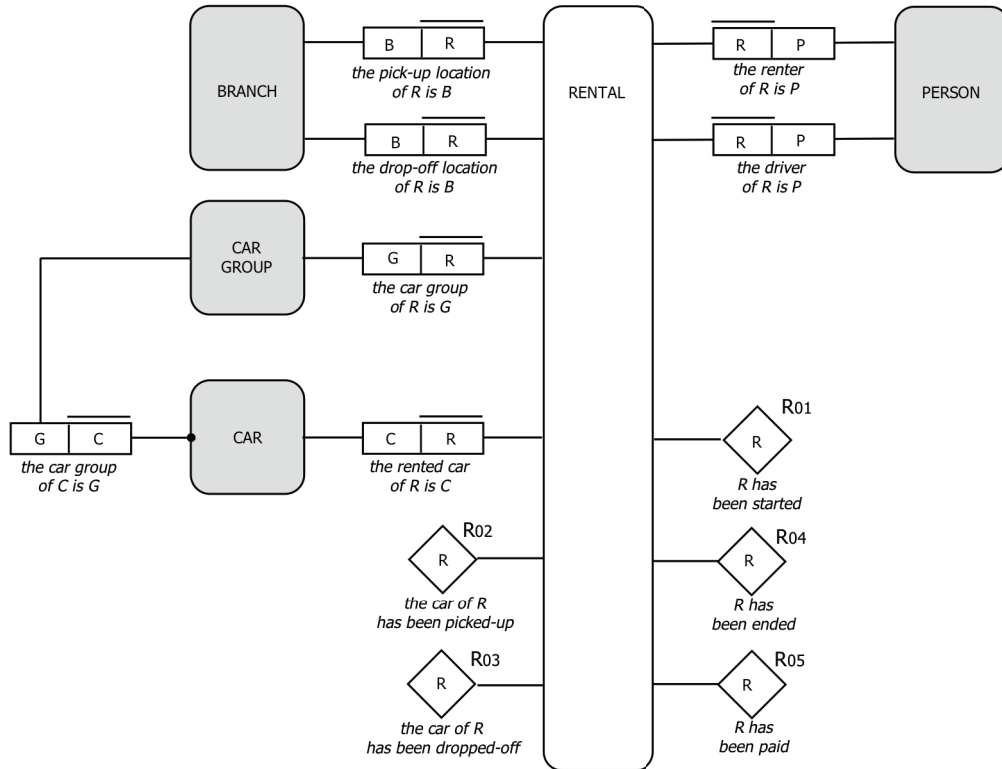
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### The Object Fact Diagram



### The Object Property List

Property	Domain	Range	Scale type
different location penalty tariff	<Funride>	EURO	R
late return penalty tariff	<Funride>	EURO	R
contracted rental duration	RENTAL	DAYS	A
rental tariff per day	CAR GROUP	EURO	R
location penalty charge (*)	RENTAL	EURO	R
number of days late (*)	RENTAL	DAYS	A
late return penalty charge (*)	RENTAL	EURO	R
actual rental charge (*)	RENTAL	EURO	R
actual rental duration (*)	RENTAL	DAYS	A



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## The Organization Construction Diagram

