Activity Diagram

Introduction

❖ The activity diagram available in SysML is similar to the one available in UML.

❖ SysML allows us an additional notation. We can describe each activity a special class (block). Each instantiation of that class represents a specific execution.

❖ Using this notation, the activities can have the association relationship (similarly to classes).
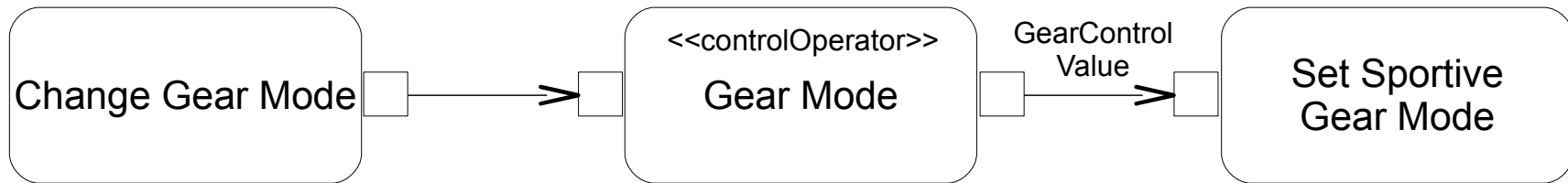
Control Operators

"A control operator specifies a behavior that can enable and

disable actions through control values."

(System Engineering with SysML/UML, Tim Weilkiens)

Control Operators

❖ The control operator enables us to control an action from the outside (e.g. starting it.. terminating it...).

❖ The control operator outputs a value that either starts or terminates the action (according to the value).

Control Operators

Control Operators

<<enumeration>>
GearControlValue
sportive economic

Continuous System

"A rate describes the frequency in which elements traverse

an activity edge or flow in and out of a parameter."

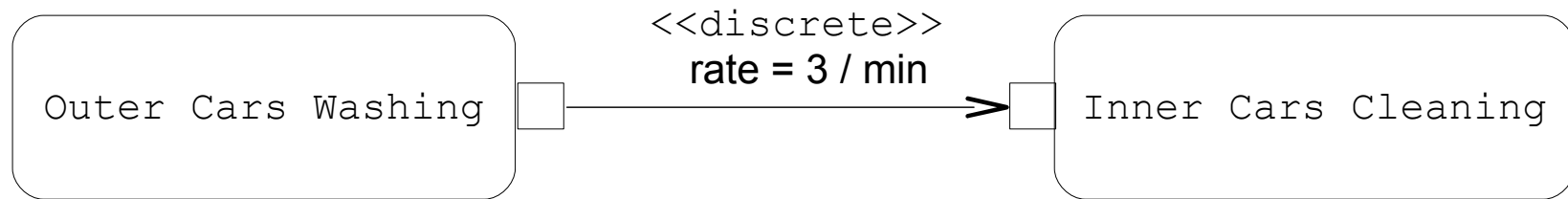(System Engineering with SysML/UML, Tim Weilkiens)

Continuous System

❖ Using `rate` we can specify parameters to be able to represent data in a specific frequency. The `rate` specifies the frequency (e.g. km per hour).

❖ Using `rate` we can specify the elements movement along an edge that connects between two actions (or activities or two object nodes).

Continuous System

❖ Using `<<continuous>>` and `<<discrete>>` we can differentiate between a continuous rate (e.g. water in a pipeline) and a discrete rate (e.g. products on an assembly line).

❖ The `rate` is denoted within curled brackets along the edge.

Continuous System

```
                   <<discrete>>
                   rate = 3 / min
┌─────────────────────┐              ┌─────────────────────┐
│                     │              │                     │
│  Outer Cars Washing ├──────────────┤> Inner Cars Cleaning│
│                     │              │                     │
└─────────────────────┘              └─────────────────────┘
```

Continuous System

❖ Both the `<<continuous>>` and the `<<discrete>>`

stereotypes extend the `<<rate>>` stereotype.

Continuous System

```
        ┌─────────────────┐
        │  <<stereotype>> │
        │      Rate       │
        └────────△────────┘
                 │
        ┌────────┴────────┐
┌───────────────┐ ┌───────────────┐
│ <<stereotype>>│ │ <<stereotype>>│
│  Continuous   │ │   Discrete    │
└───────────────┘ └───────────────┘
```
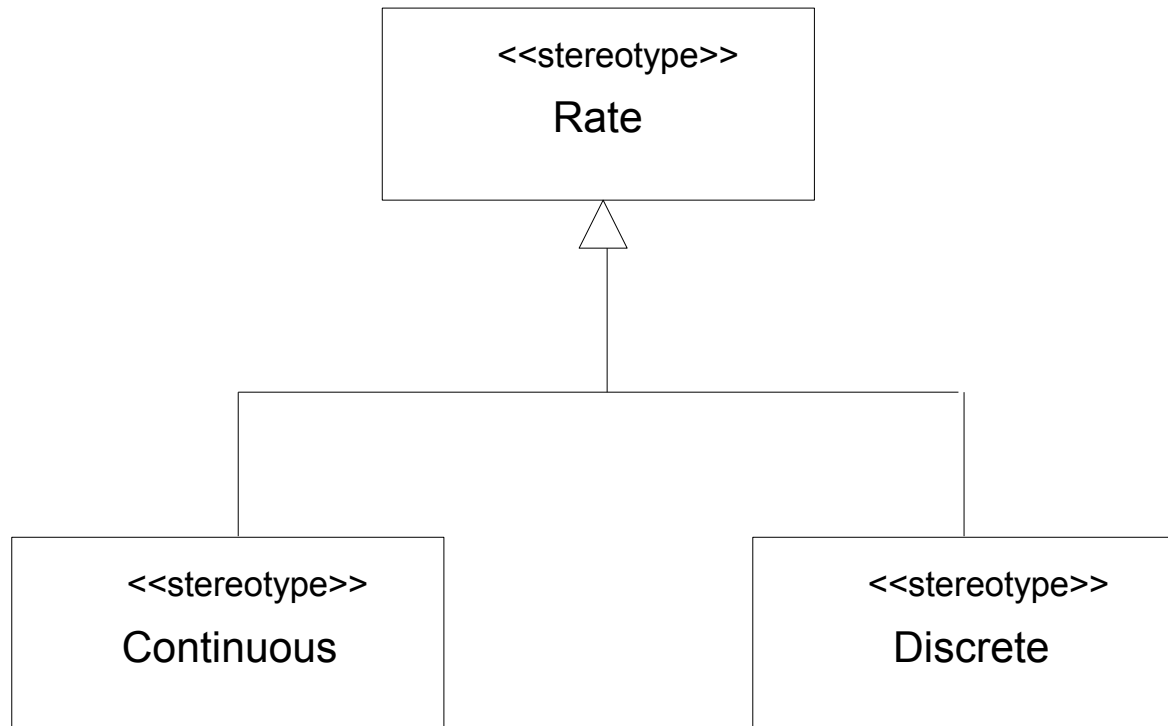
Flows Probabilities

"A probability describes at an outgoing edge of a choice or an object node how probably it is that this edge will be used by a token."

(System Engineering with SysML/UML, Tim Weilkiens)

Flows Probabilities

❖ A probability is a value between 0 and 1. It describes at each outgoing edge the probability of a token to flow over it.

❖ The sum of all probabilities for edges that share the same origin should be 1.

Flows Probabilities

{probability=0.5}

Turn Right

Enter The Junction

{probability=0.5}

Turn Left
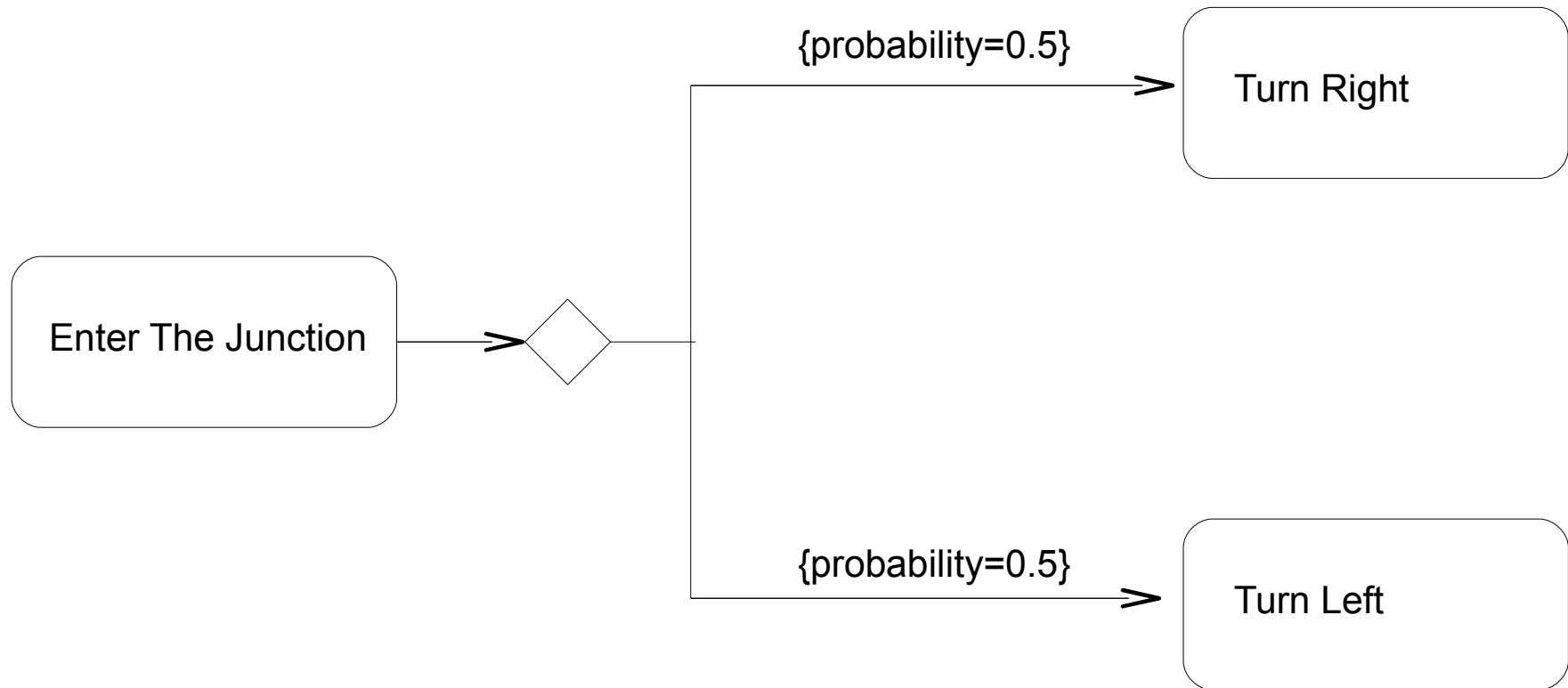
Function Trees

❖ Each activity is kind of a special class. Each object of this class is a concrete execution.

❖ Activities can be generalized and can form composition relationships.

❖ These possible relationships can be represented as trees.

Function Trees

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