# Opti'tour Glossary

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**Abstract**—This document defines the core vocabulary and key terms used in the project.

**Keywords**—*Actors, Business Rules, State Definitions*

## 1. Definitions

### City Map ("map")

The city map is the central element of the system. It models the **urban road network** as a directed graph: intersections are nodes and road segments are edges. Each segment has a direction, length, and street name. This structure allows the system to compute routes between any two points based on distance and estimated travel time. The map also stores the list of available couriers, delivery requests, and an adjacency structure used for route optimization.

### Courier

The courier is the person who performs deliveries by bicycle. Each courier has:

- a unique identifier,
- a name and a phone number,
- a current location (typically the warehouse at departure).

Couriers are assigned one or more tours depending on workload and the dispatcher's decisions. In the system, the courier is the **executor of the computed route**.

### Delivery

A delivery is the **operational form** of a delivery request once integrated into a tour. It connects concrete objects of the model:

- the pickup and delivery intersections,
- the assigned courier,
- the service times and planned departure time.

Each delivery is one step in a courier's route.

### Delivery Request

A delivery request corresponds to a **customer order**. It specifies:

- a pickup location,
- a delivery location,
- the service times required at each stop (pickup and delivery).

Requests are received by the dispatcher and imported from XML files. Each request may later be converted into a planned **delivery** within a courier's tour.

### Dispatcher

The dispatcher manages delivery operations. They load the city map, adjust the number of couriers, import and record delivery requests, and oversee all tours. When a tour cannot be computed for a courier, the dispatcher decides whether to assign another courier or reject the request.

### Intersection

An intersection represents a **precise geographic point** in the city. Each intersection is identified by a unique number and defined by latitude and longitude. Intersections serve as reference points for deliveries and as endpoints for road segments.

### Road Segment

A road segment connects two intersections in a single direction and represents a **street portion** a courier can traverse. Each segment contains:

- a starting intersection,
- a destination intersection,
- a length (in meters),
- a street name,
- an estimated travel time based on the courier's constant speed (15 km/h).

These segments form the basis for computing paths and travel durations between addresses.

### Tour

A tour is the **complete route** assigned to a courier. It includes:

- all deliveries to be completed,
- the total travel distance and time,
- the total service time,
- the start and end times of the journey.

Each tour starts and ends at the warehouse, by default at 8:00 a.m. Whenever a new delivery request is added, the system recalculates the tour to **minimize the return time** to the warehouse.

## 2. Business Rules

1. All tours start at **8:00 a.m.** from the warehouse.
2. Couriers travel at a constant speed of **15 km/h**.
3. The system always seeks to **minimize the return time** to the warehouse.
4. For each request, the pickup location must be visited **before** its corresponding delivery location.
5. All tours begin and end at the **same warehouse**.
6. Each courier's tour is displayed on the map with all stops, addresses, and arrival times.
7. If no valid route can be found for one courier, the system proposes another courier; if no solution exists, the request must be rejected.
8. Tours can be saved and restored at any time to continue planning later.

## 3. State Definitions

**Active Tour**
: A tour currently being executed by a courier.

**Completed Tour**
: A tour successfully executed by a courier, ending at the warehouse.

**Feasible Tour**
: A tour that satisfies all business rules: pickups before deliveries, all requests covered, and the courier can return to the warehouse.

**Infeasible Tour**
: A tour that violates one or more rules, for example when the courier cannot reach all addresses or the pickup/delivery order cannot be respected.

**Rejected Request**
: A delivery request that cannot be assigned to any courier and is marked as rejected by the dispatcher.