Space transportation company

BI-KOM, Semestral thesis

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Contents

1 Domain description

This domain describes necessities which are required for running a space transportation company. It consists of the *company* itself, *external subjects*, *contracts*, *space vehicles*, *buildings* and *people* within the company's life cycle.

1.1 Parts of domain

1.1.1 Company

The company is the hearth of the whole domain. It is (in)directly connected with all of the main parts of our domain. The company itself is represented as the kind *Transportation company* which is the strongest bearer of identity of the whole domain. You can imagine domain as a big suitcase carrying all entities and *Transportation company* as a lock to access other entities from the ontological point of view.

1.1.2 External subjects

We can understand external subjects as the customers of our company. Our company offers civil and military services. This fact implies that also our customers will be divided into the civil and military external subjects.

1.1.3 Contracts

Contracts are formal agreements between the company and the customers. *Civil subjects* are capable of signing *Civil* and *Cargo contracts*. *Military subjects* are capable of signing *Military* and *Cargo contracts*. The character of these agreements implies from the OntoUML model itself.

1.1.4 Space vehicles

Space vehicles are used for transportation of the particular type of a domain. Our company focuses, particularly on the civil, cargo and military domain.

The civil domain consists mainly of the transportation of the people and all living beings in the universe. In our company, we can find standard transport ships but also robust colony ships.

Cargo domain is directly responsible for the transportation of various types of cargo. We can find vehicles transporting common materials which are divided into the main spaceships and helper cargo drones and shuttles. The company also offers transportation of dangerous and valuable types of materials. There are special vehicles designed for this kind of a job.

The military domain consists of military vehicles. We can find many types of military vehicles in this domain, including light and heavy cruisers, escort vessels, and attack fighters. They are designed for armed conflicts and are capable of resisting heavy damages.

1.1.5 Buildings

The company owns several types of buildings. Those are namely *office*, *hangar* and *warehouse*. All of the administrative work including contracts and relations with customers are connected to *the office*. *A hangar* is a place where the company stores its vehicles. *The warehouse* holds cargo and material and handles all of the operations connected with it, including loading and unloading of the cargo ships.

1.1.6 People

We can divide people into two distinct categories – staff and passengers.

Staff can be divided into the land and flight staff. Flight staff includes roles which are necessary for successful flights including the captain, officers, securities, etc. Land staff includes managers and people responsible for the proper functioning of the buildings and people responsible for the ships while they are docked in the hangars.

Passengers are people who are traveling by the spaceships because they had signed a contract for the transportation. Our company offers transportation of the civil but also of the military passengers

1.2 Constraints

1. Captain of each flight cannot be assigned to other staff roles.
2. Each flight has to have disjoint staff and passengers.
3. One vehicle cannot be assigned to the multiple flights at the same time.

2 OntoUML model

2.1 Table of used constructs

Construct	Occurrences	Total count
Kind	Person, Transportation company, Military subject, Civil subject, Valuable material type, Cargo support, Dangerous material type, Freighter, Escord vessel, Attack fighter, Cruiser, Transport ship, Building, Flight, Platinum, Gold, Chassis, Engine, Phaser, Bridge, Fuel tank	21
SubKind	Military contract, Cargo contract, Civil contract, Cargo drone, Cargo shuttle, Trading vessel, Cargo ship, Heavy cruiser, Light cruiser, Colony ship, Office, Hangar, Warehouse, Civil flight, Military flight, Cargo flight	16
Role	Officer, Security, Manager, Steward, Repairman, Passenger, Flight staff, Land staff, Staff, Director, Flight manager, Land manager, Civil passenger, Military passenger, Captain, Storekeeper, Cleaner, Contracts manager	18
Phase	Active, In reserve, Loaded ship with valuable material, Unloaded ship, Discarded, Finished flight, Ongoing flight, Future flight	8
Category	External subject, Vehicles, Cargo vehicles, Civil vehicles, Special, Common, Military vehicles, Noble metals	8
RoleMixin	Customer	1
Mixin	Valuable material	1
Whole	Flight crew, Transportation company, Cruiser, Fuel	4
Parts	Security, Steward, Repairman, Officer, Captain, Director, Bridge, Chassis, Engine, Phaser, Fuel tank, Dilithium, Antimatter, Building	14
Quantity	Fuel, Dilithium, Antimatter	3
Collective	Flight crew	1
Quality	Speed, IQ, Fuel level	3
Mode	Colonization type, Leadership potential	2
Relator	Employment contract, Contract	2
Formal	Officer, Military vehicles	2
Event	Loading material, Colonization	2

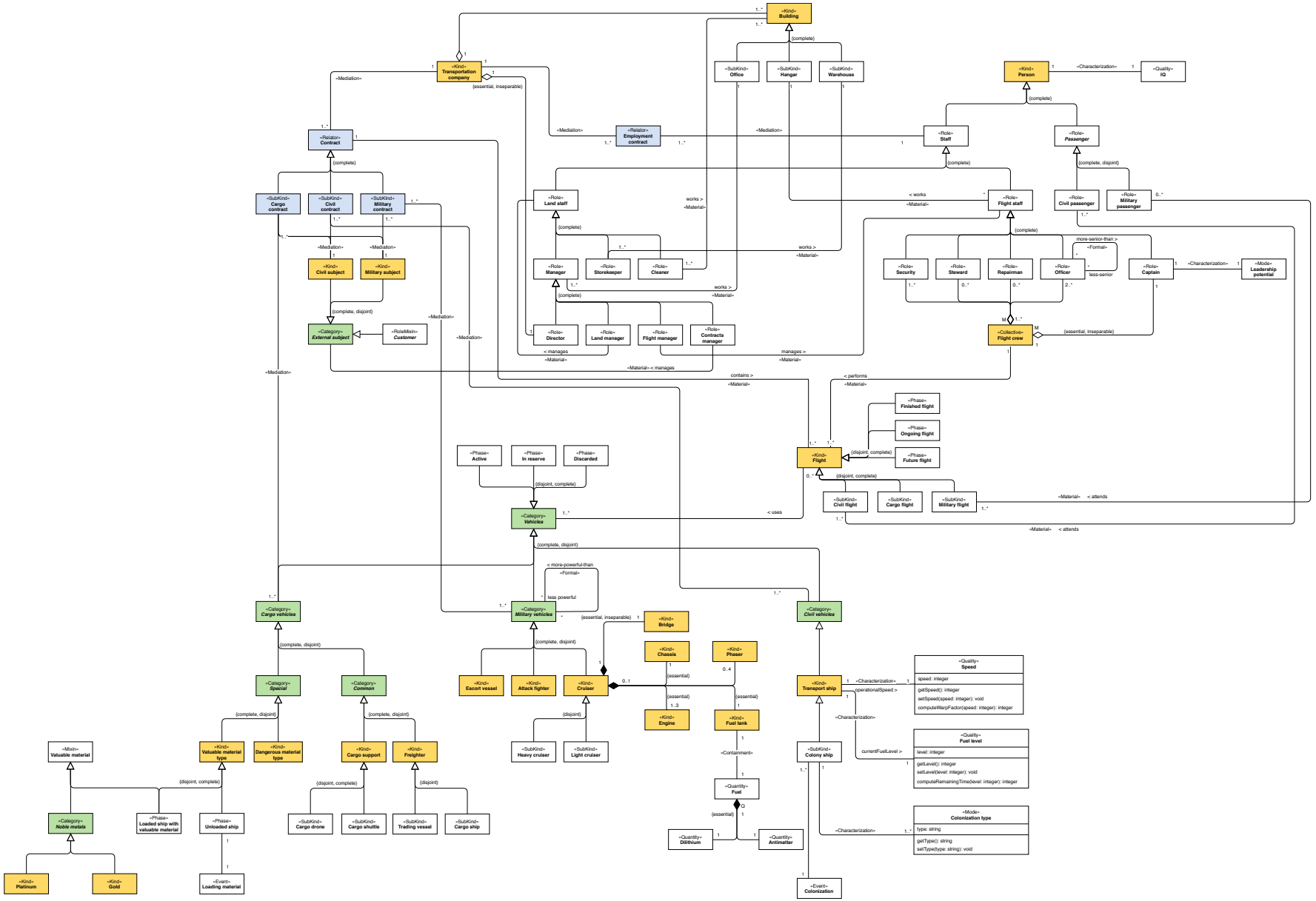
2.2 OCL

```
/* Captain of each flight cannot be assigned to other staff roles. */

context Flight
def: staff:Collection(Flight staff) = self.flightCrew.staff
def: captain:Flight staff = self.flightCrew.captain
inv: staff->one(captain)

/* Each flight has to have disjoint staff and passengers. */

context Flight
def: staff:Set(Flight staff) = self.flightCrew.staff->asSet()
def: passengers:Set(Passenger) = self.attenders
inv: passengers->intersection(staff)->isEmpty()

/* One vehicle cannot be assigned to the multiple flights at the same
   ↪ time. */

context Vehicles
def: finishedFlights:Set(FinishedFlight) = self.flights->select(f | f.
   ↪ isOclType(FinishedFlight))
inv: finishedFlights>forAll(f | not f.overlapsWithElse(finishedFlights))
```

2.3 OntoUML model

Model can be found below this description. Entities are grouped into the several categories and these categories can be distinguished by several colors:

- orange – provides identity
- blue – relators
- orange – categories
- white – other


«Kind» Building
«Kind» Transportation company
(essential, inseparable)
«SubKind» Office
«SubKind» Hangar
«SubKind» Warehouse
«Kind» Person
«Characterization»
«Quality» IQ
(complete)
«Mediation»
«Relator» Contract
«Relator» Employment contract
«Role» Staff
«Role» Passenger
(complete, disjoint)
«SubKind» Cargo contract
«SubKind» Civil contract
«SubKind» Military contract
«Role» Land staff
«Role» Flight staff
«Role» Civil passenger
«Role» Military passenger
works > «Material»
< works «Material»
«Kind» Civil subject
«Kind» Military subject
«Role» Manager
«Role» Storekeeper
«Role» Cleaner
«Role» Security
«Role» Steward
«Role» Repairman
«Role» Officer
«Role» Captain
«Mode» Leadership potential
more-senior-than >
«Formal»
less-senior
«Category» External subject
«RoleMixin» Customer
«Role» Director
«Role» Land manager
«Role» Flight manager
«Role» Contracts manager
«Collective» Flight crew
(essential, inseparable)
< manages «Material»
manages > «Material»
contains > «Material»
< performs «Material»
«Phase» Active
«Phase» In reserve
«Phase» Discarded
«Phase» Finished flight
«Phase» Ongoing flight
«Phase» Future flight
«Kind» Flight
(disjoint, complete)
«SubKind» Civil flight
«SubKind» Cargo flight
«SubKind» Military flight
«Material» < attends
< attends «Material»
«Category» Vehicles
< uses
«Category» Cargo vehicles
«Category» Military vehicles
«Category» Civil vehicles
< more-powerful-than
«Formal»
less powerful
«Kind» Bridge
«Kind» Chassis
«Kind» Phaser
«Kind» Escort vessel
«Kind» Attack fighter
«Kind» Cruiser
«Kind» Engine
«Kind» Fuel tank
«Kind» Transport ship
«Quality» Speed
speed: integer
getSpeed(): integer
setSpeed(speed: integer): void
computeWarpFactor(speed: integer): integer
operationalSpeed >
«Quality» Fuel level
level: integer
getLevel(): integer
setLevel(level: integer): void
computeRemainingTime(level: integer): integer
currentFuelLevel >
«Mode» Colonization type
type: string
getType(): string
setType(type: string): void
«Category» Special
«Category» Common
«Kind» Valuable material type
«Kind» Dangerous material type
«Kind» Cargo support
«Kind» Freighter
«Mixin» Valuable material
«Category» Noble metals
«Phase» Loaded ship with valuable material
«Phase» Unloaded ship
«Kind» Platinum
«Kind» Gold
«Event» Loading material
«SubKind» Cargo drone
«SubKind» Cargo shuttle
«SubKind» Trading vessel
«SubKind» Cargo ship
«SubKind» Heavy cruiser
«SubKind» Light cruiser
«SubKind» Colony ship
«Quantity» Fuel
«Quantity» Dilithium
«Quantity» Antimatter
«Event» Colonization

3 Resources

- ontouml.readthedocs.io
- moodle.fit.cvut.cz