**Problem 3 :**For your TVM, elicit, decide, and describe each relevant concept. For your TVM, elicit, decide, and describe each relevant relationship between the concepts. For your TVM, construct a problem domain model, say, DMIGO, using UML.

The domain model is a representation of meaningful real-world concepts pertinent to the domain that needs to be modeled in software. The concepts include the data involved in the business and rules the business uses in relation to that data. It consists of concepts, properties of concepts and relationships between concepts. The concepts are the classes in a domain model and the properties of concepts are the attributes of the classes.

**Description of problem domain model for TVM**

1. **iGo TVM**

The role of Ticket Vending Machine (TVM iGo) is to provide an interface to its users to buy tickets and recharge metro cards. It is the major component and the central concept in the problem domain model .

This class has two **attributes** namely **language** and **address**. Language corresponds to the languages which are supported by our TVM iGo which are French and English . Address corresponds to the location where our TVM iGo is located . Since our iGo is located at places other than metro stations like vital bus stops and central places of the city, so this attribute is very significant for our iGo TVM.

***Description of relationships***

As seen in the problem domain model iGo TVM is related to other concepts in the domain model in the following ways .The description includes the cardinality constraints between the classes as well.

* iGo TVM is used by one-to-many Commuters.
* One-to-many iGo TVM can be used to recharge zero to many Metro Card.
* One-to-many iGo TVM dispenses one to many Tickets.
* One iGo TVM has a one payment component.
* One-to-many iGo TVM can generate one to many Receipts.

1. **Payment Component**

iGo TVM has a payment component which is embedded in it. The role of payment component is to allows users to insert card(debit/card) or insert cash currency in it to make payment while buying tickets or recharging metro card .

***Description of relationships***

* One iGo TVM has one Payment Component
* One Payment Component is connected to one-to-many banks.
* One Payment Component is used by one-to-many Commuters

1. **Bank**

The role of bank is to authenticate payments made by the commuters using Payment Component while purchasing tickets and recharging metro cards using credit/debit card.

***Description of relationships***

* One-to-many payments are authenticated by one-to-many Banks
* One-to-many banks are connected to one Payment Component of TVM iGo.

1. **Commuter**

The user who’s using the iGo TVM machine

***Description of relationships***

* One-to-many commuters can purchase one-to-many tickets
* One commuter can posse zero or one metro card
* One-to-many commuters can use one-to-many iGo TVMs

1. **Metro Card**

A Metrocard is a smart composed of a magnetic chip, that can be recharged at all iGo TVMs.

***Description of relationships***

* One commuter can own one smart card
* One-to-many Metro Cards can be recharged by one-to-many iGo TVMs

1. **Ticket**

A paper ticket made for a limited amount of usages.

***Description of relationships***

* One-to-many tickets can be purchased by one-to-many commuters
* One-to-many tickets can be dispensed by one-to-many iGo TVMs

1. **Payment**

A payment contains information about the transaction selected. It can be fulfilled either by cash or debit/credit card. Only one payment per session.

***Description of relationships***

* One payment is authenticated by the bank
* One payment is noted on a receipt

1. **Receipt**

Contains proof of purchase, with information such as **date, time** and **amount.** It can be either printed or sent by email.

***Description of relationships***

* A receipt contains information of one payment
* A receipt is generated by one-to-many TVMs