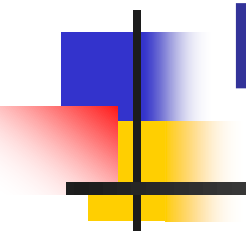
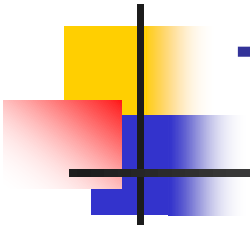


Creating and Displaying Many Products

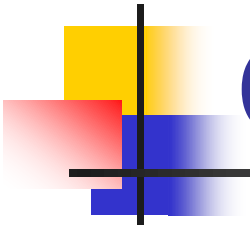
Info 5001 – Application Modeling and Design

Dr. Kal Bugrara



The problem

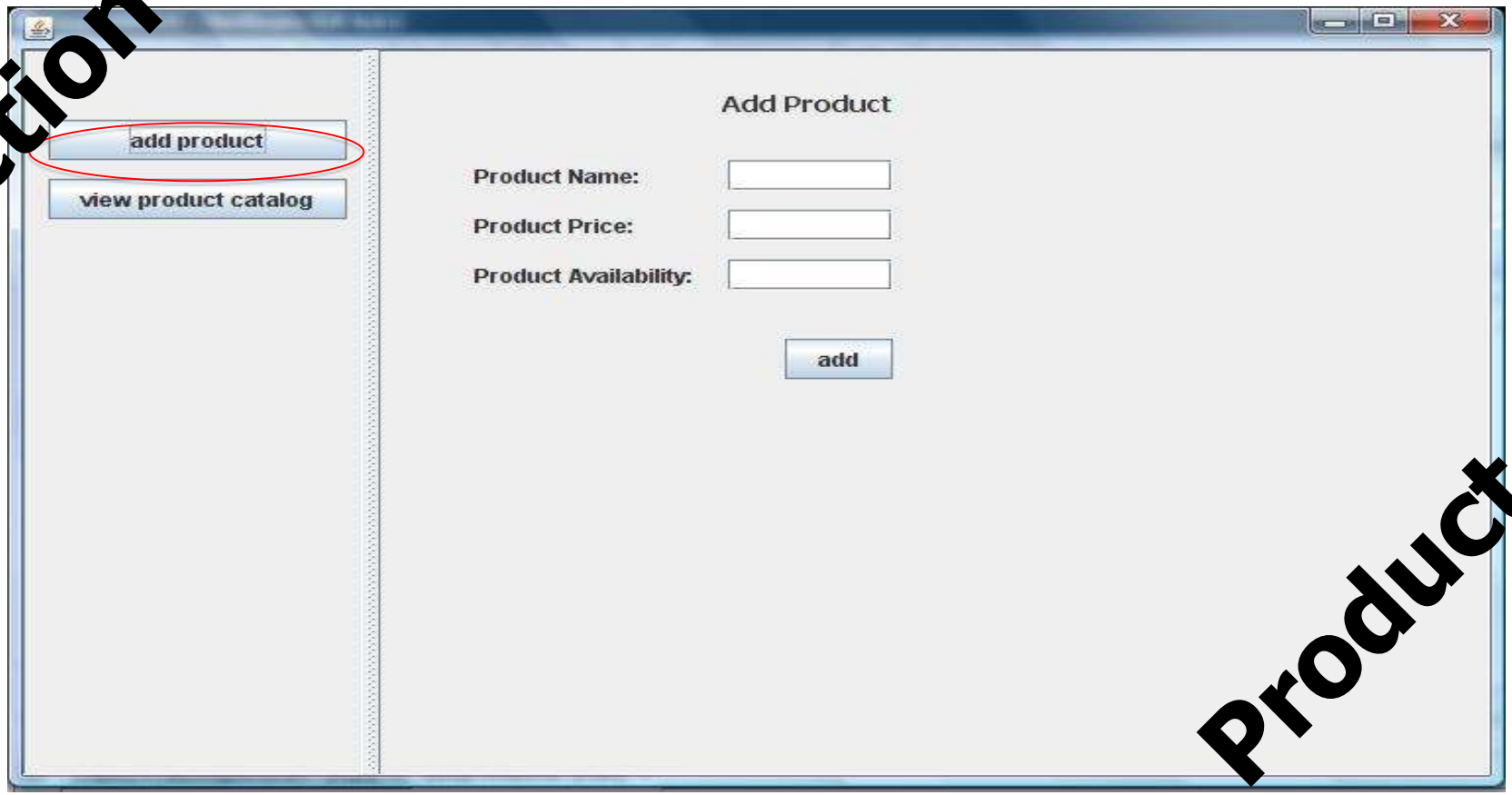
- Businesses sell products to customers.
- They must organize their products so customers know about them in terms of features, availability, and price.
- Sometimes, new products get added, discontinued, updated, etc.
- Business need software to help them managing their products (product catalog).



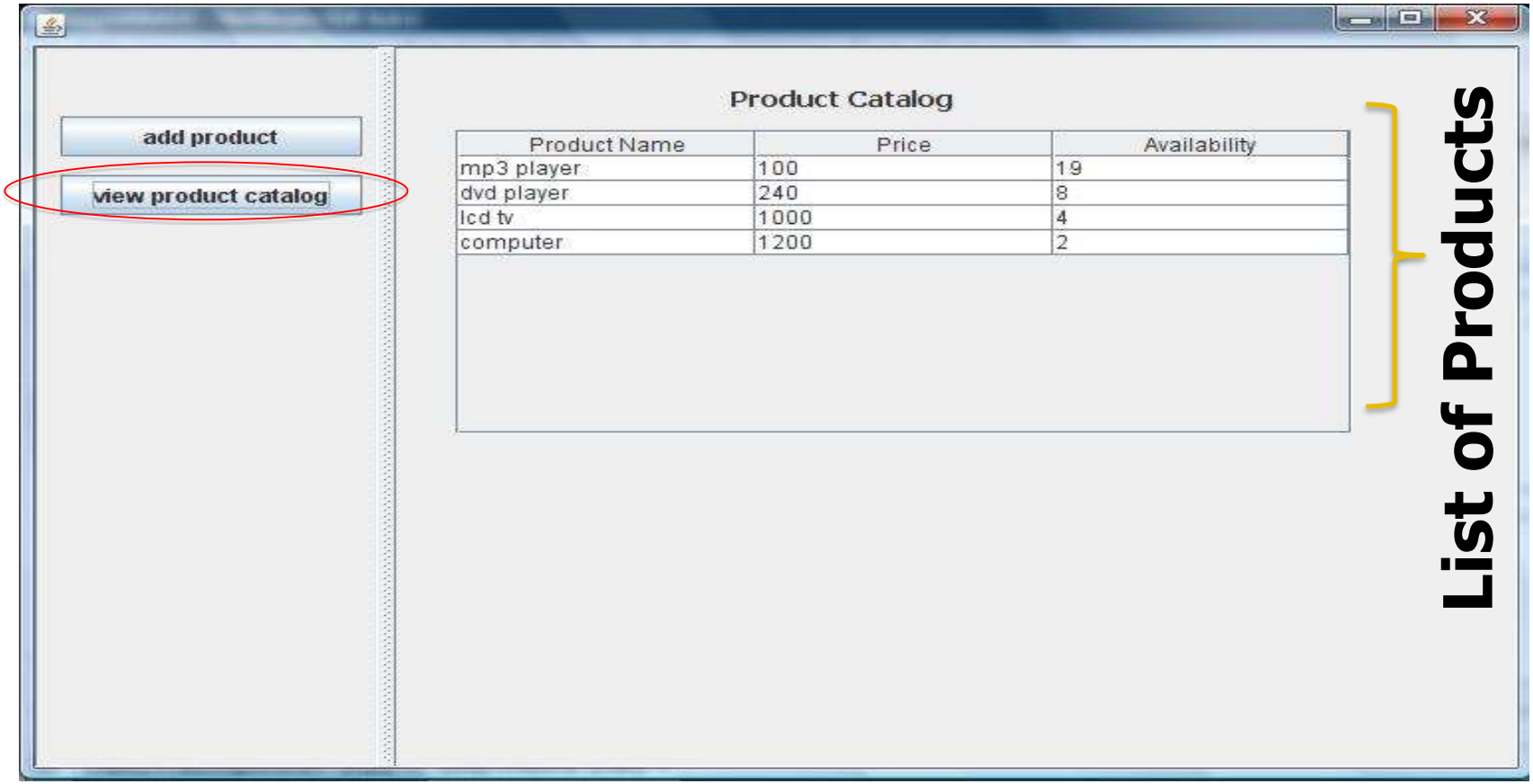
Objective

- Design Principles and their applications
  - Hierarchy –break components down to smaller meaningful pieces (simpler)
  - Modularity – Attributes that have difference timelines must be separated
  - Encapsulation
    - Components handle their own data and function
- How to handle group of components

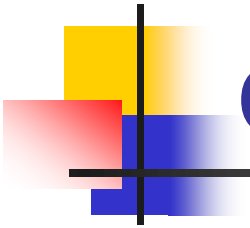
The Application: Add Product



The Application: Browse products

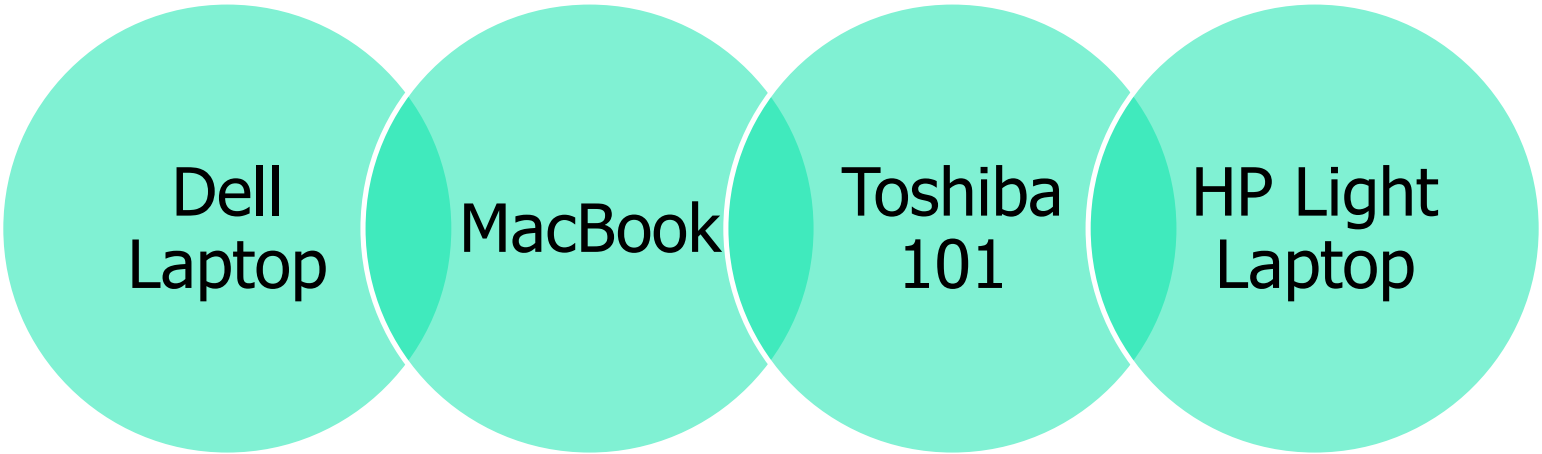


Key Question: How to organize the products?

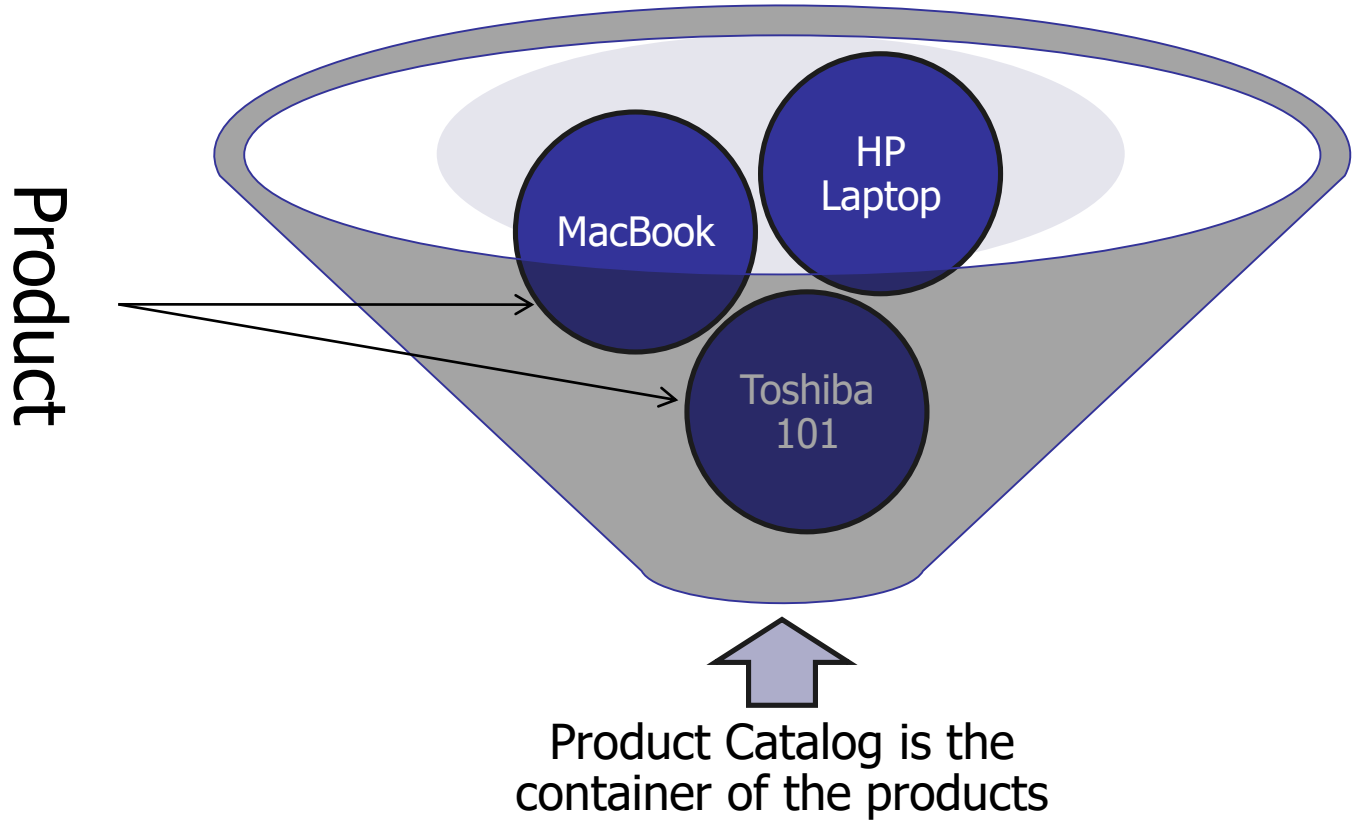


- We know how to keep track of a single product through a reference variable, but what if we have many products?
- Where to keep the products?
- How find an existing product?
- How to list them?

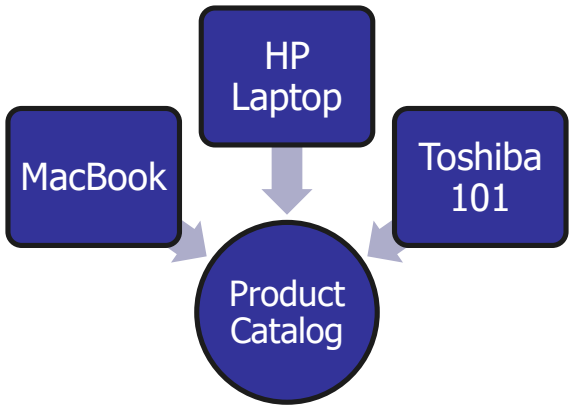
The answer: Build an information model first

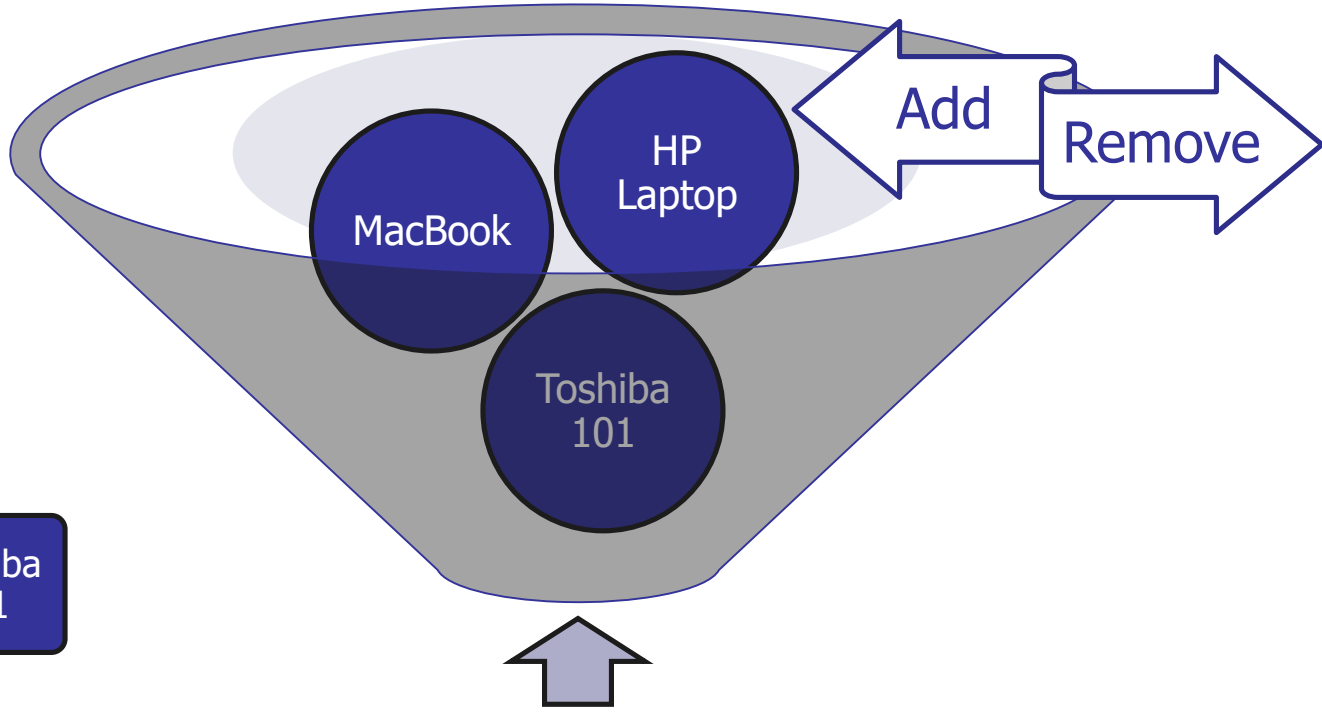


We have a collection of products: The product catalog



Operations on product catalog





So what is the information model for the product catalog?

Is it

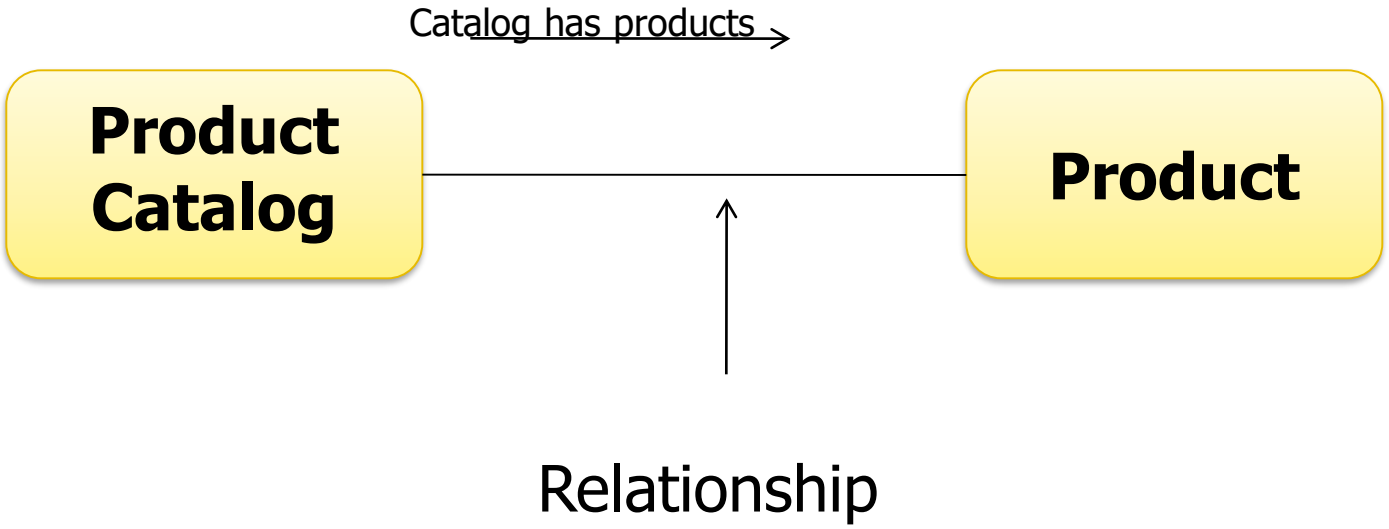
Product Catalog

Or

Product

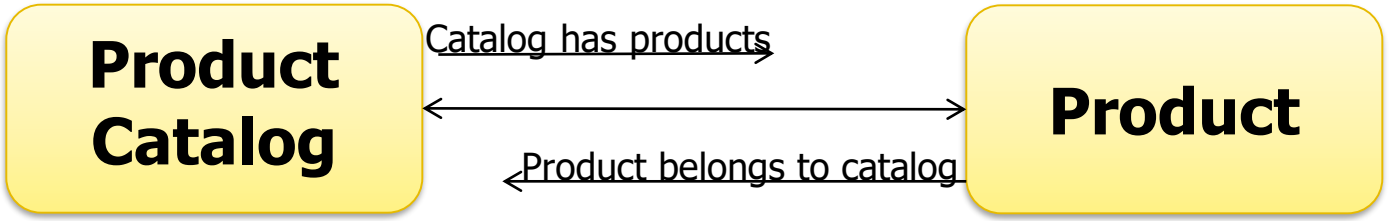
Product catalog keeps track of products

Or



Product catalog keeps track of products

Relationship connections give meaning to concepts:



Product catalog keeps track of products (manages products)

Product group info goes here

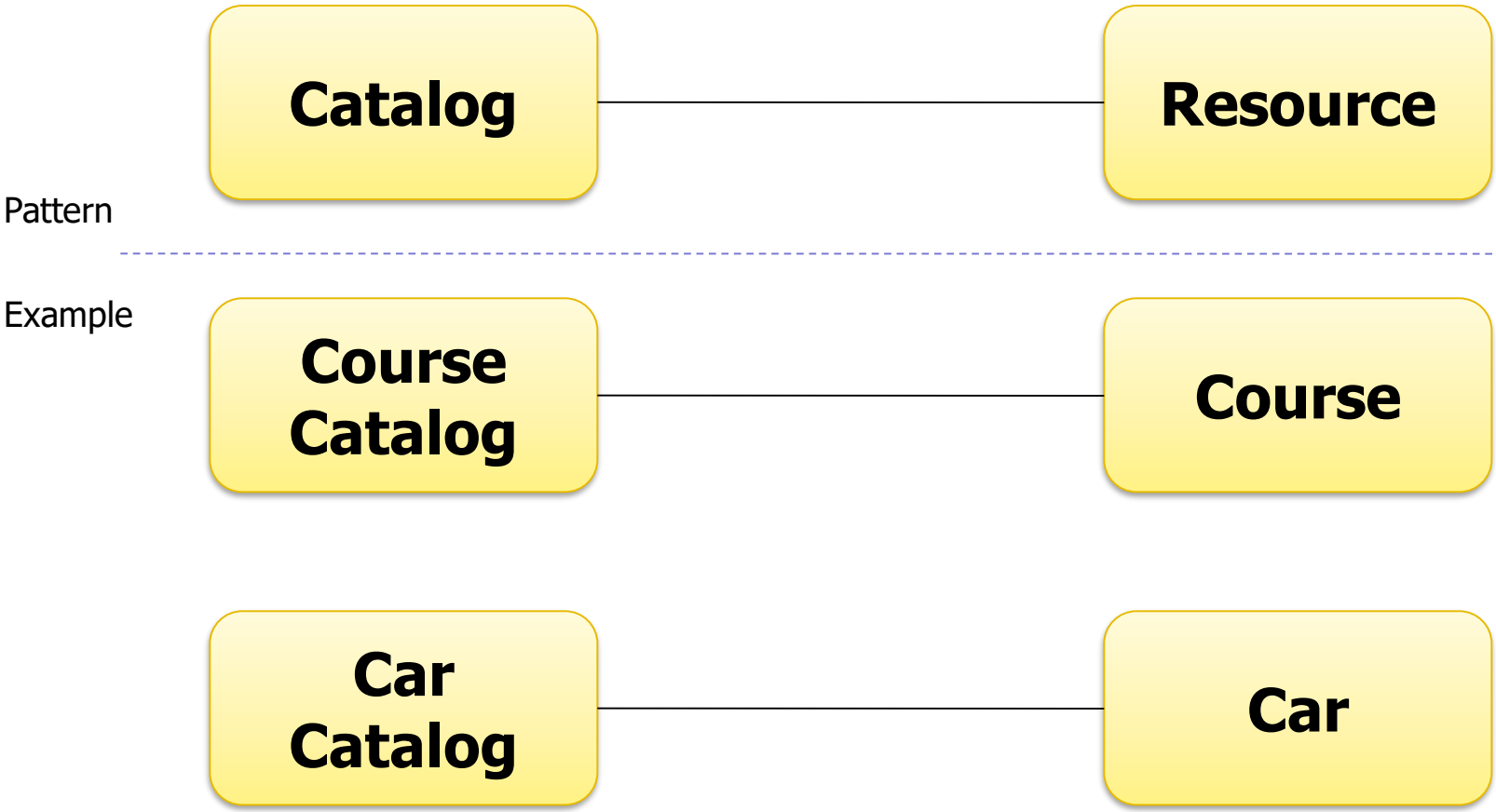
Product info goes here

Group specific and does not care about details of individual products: Its responsibilities include:

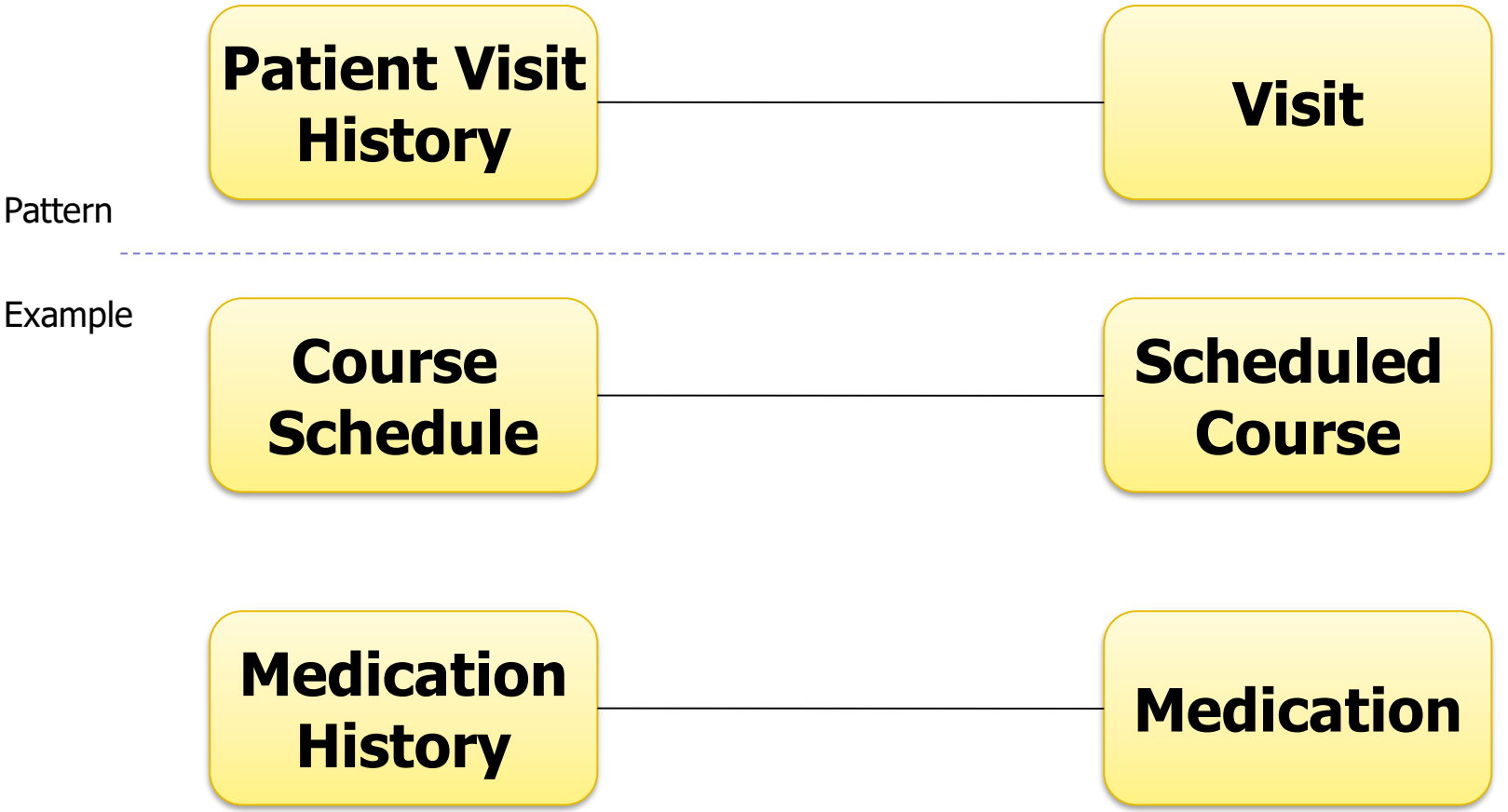
1) Creating new products
2) Add a product to the current list
3) Find and remove from the list
4) Find and update a specific product

Specific to a product like its price, avail, desc, etc.

Other Catalog Patterns (AKA factory pattern)



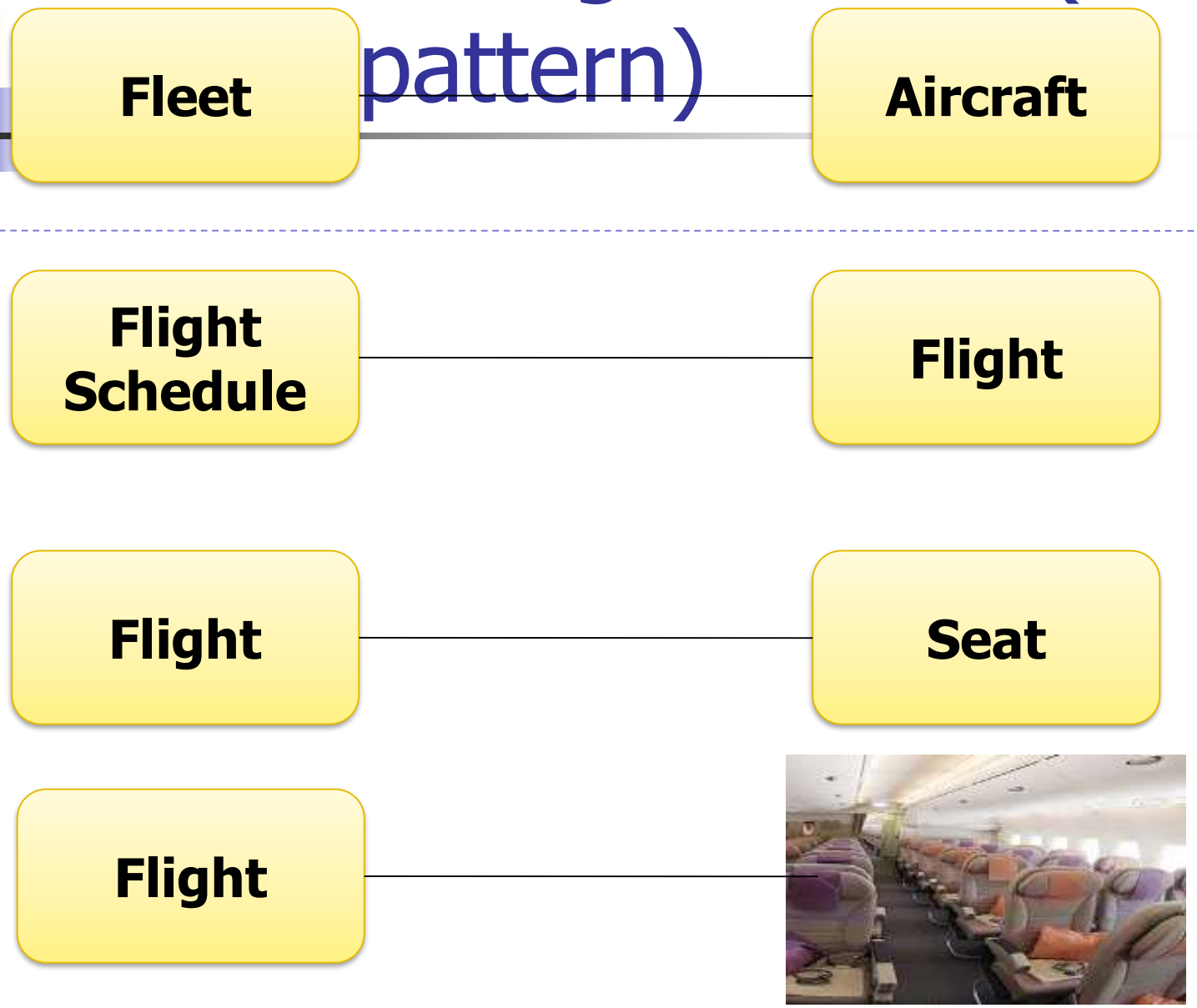
Other Catalog Patterns (AKA factory pattern)



Other Catalog Patterns (AKA pattern)

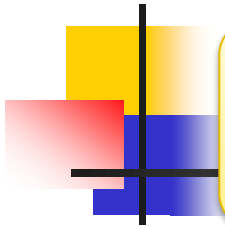
Pattern

Example



Pattern

Example



Fleet — Aircraft

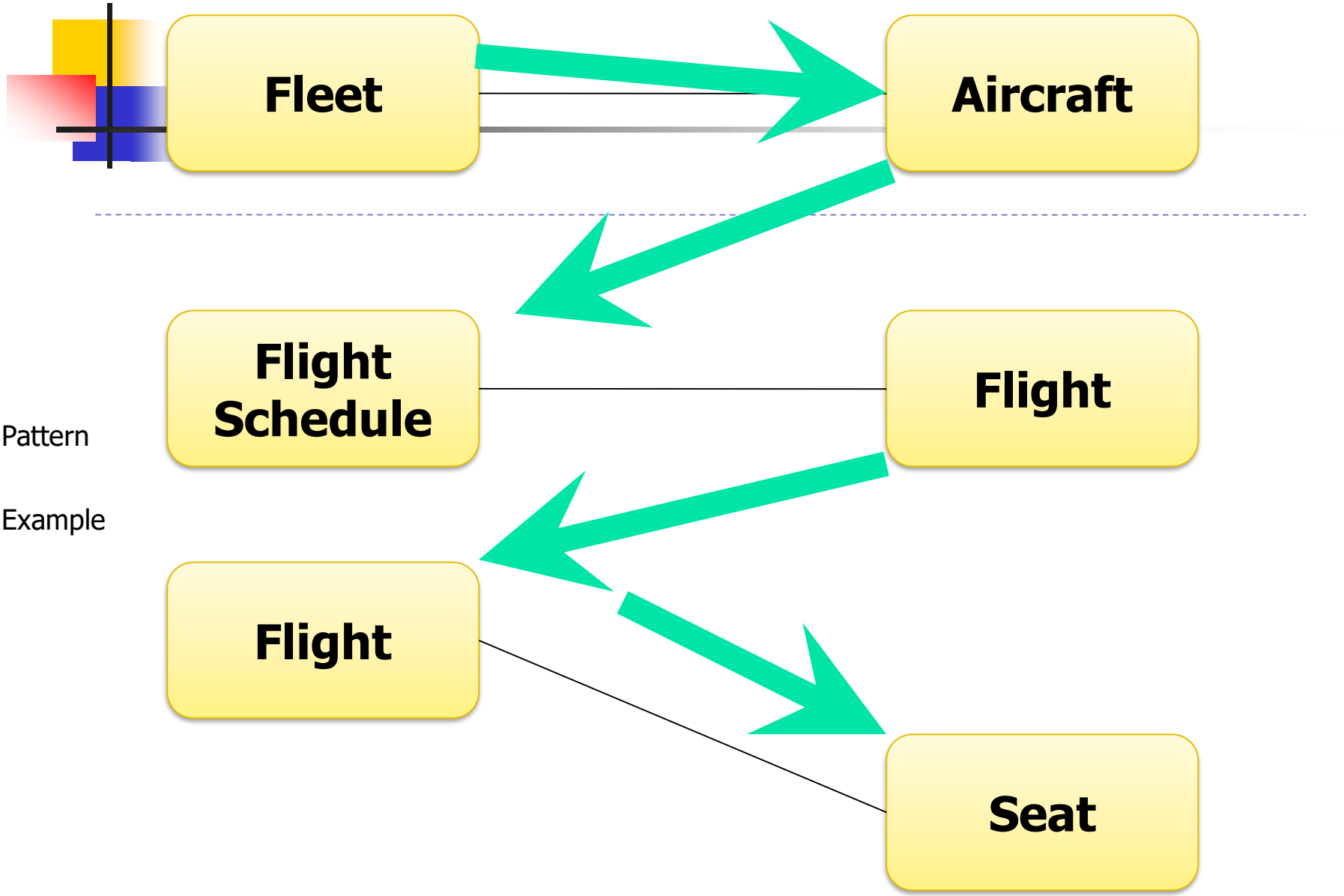
Flight Schedule — Flight

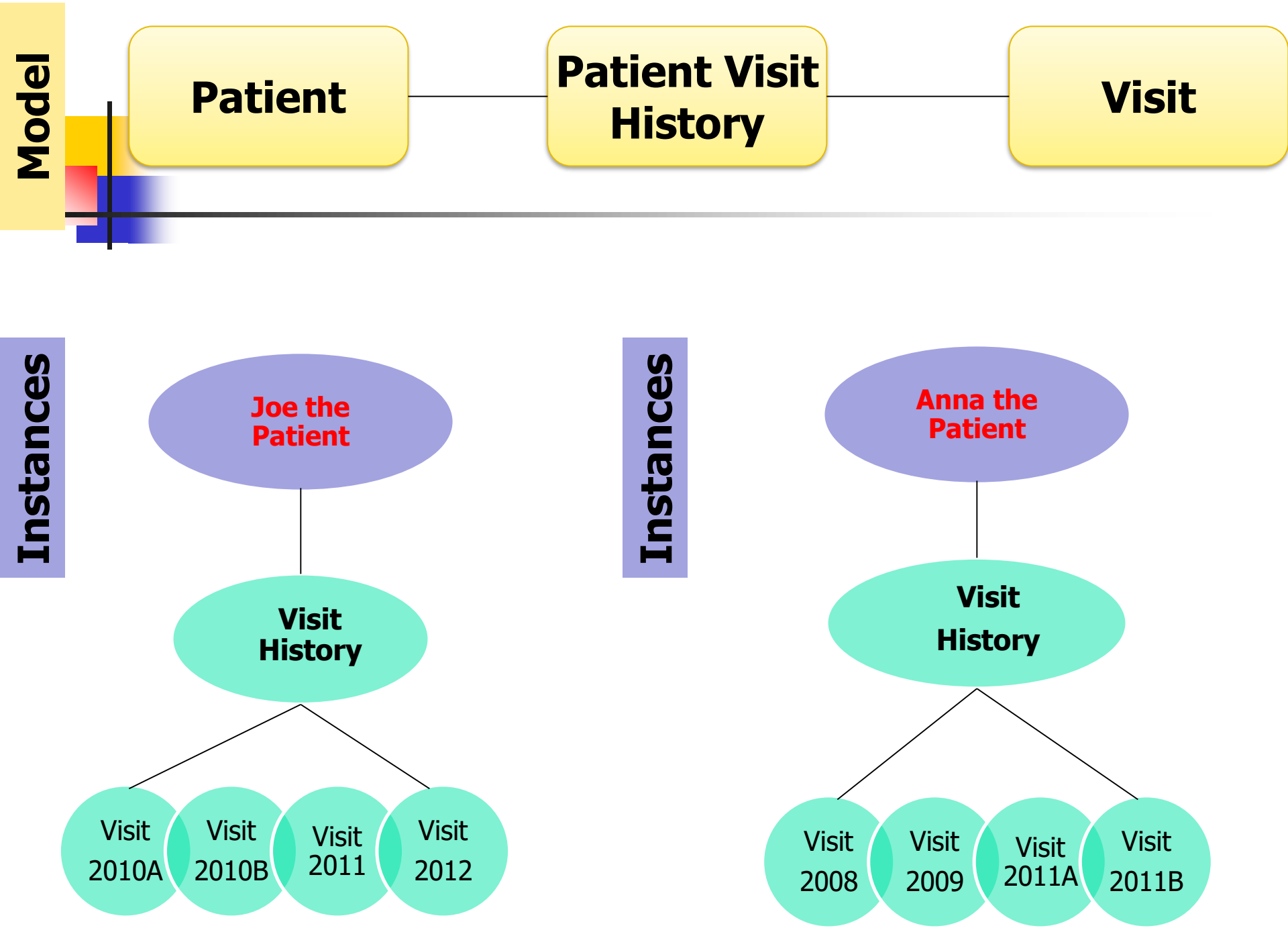
Flight — Seat

Flight

Pattern

Example

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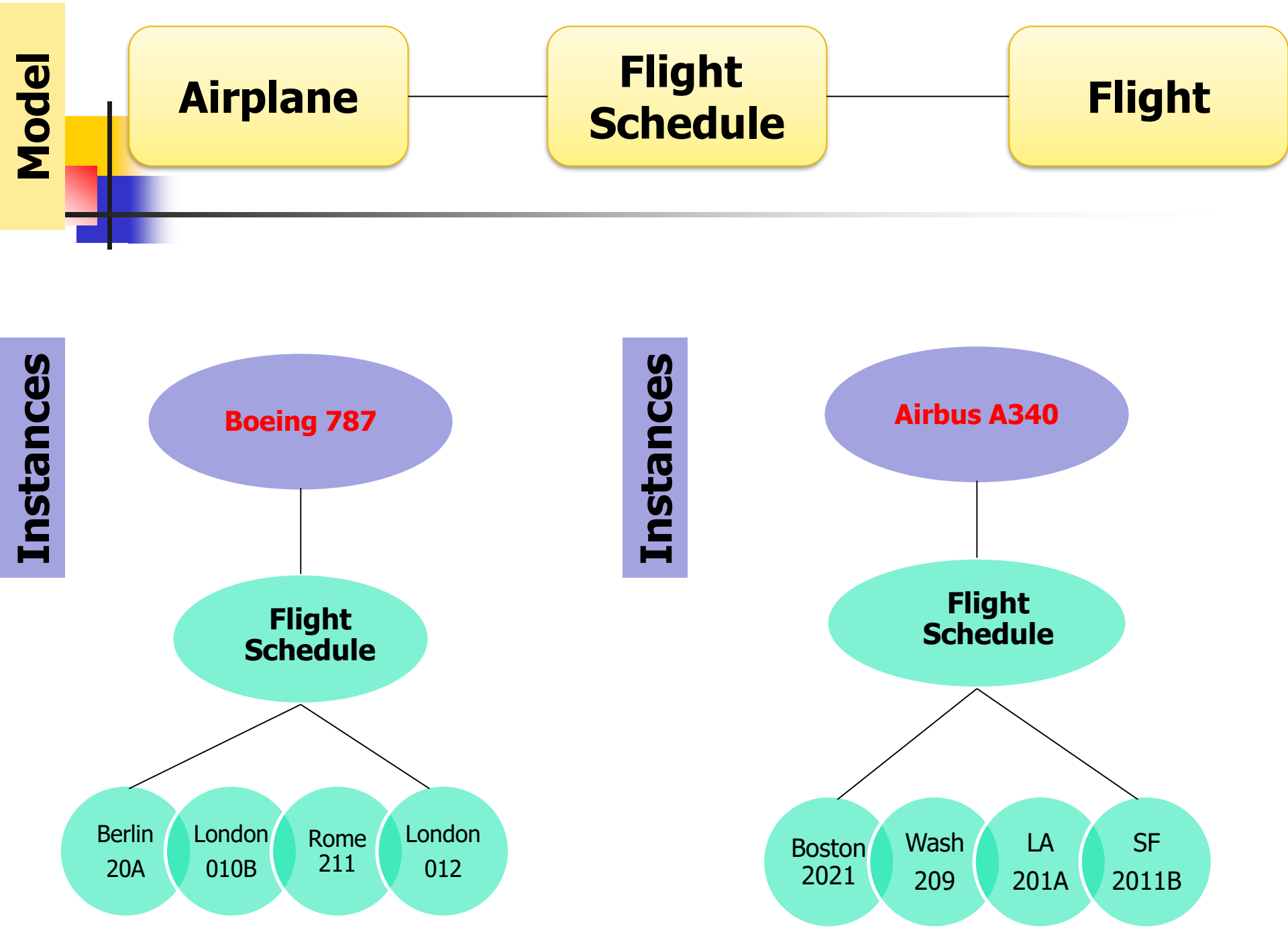
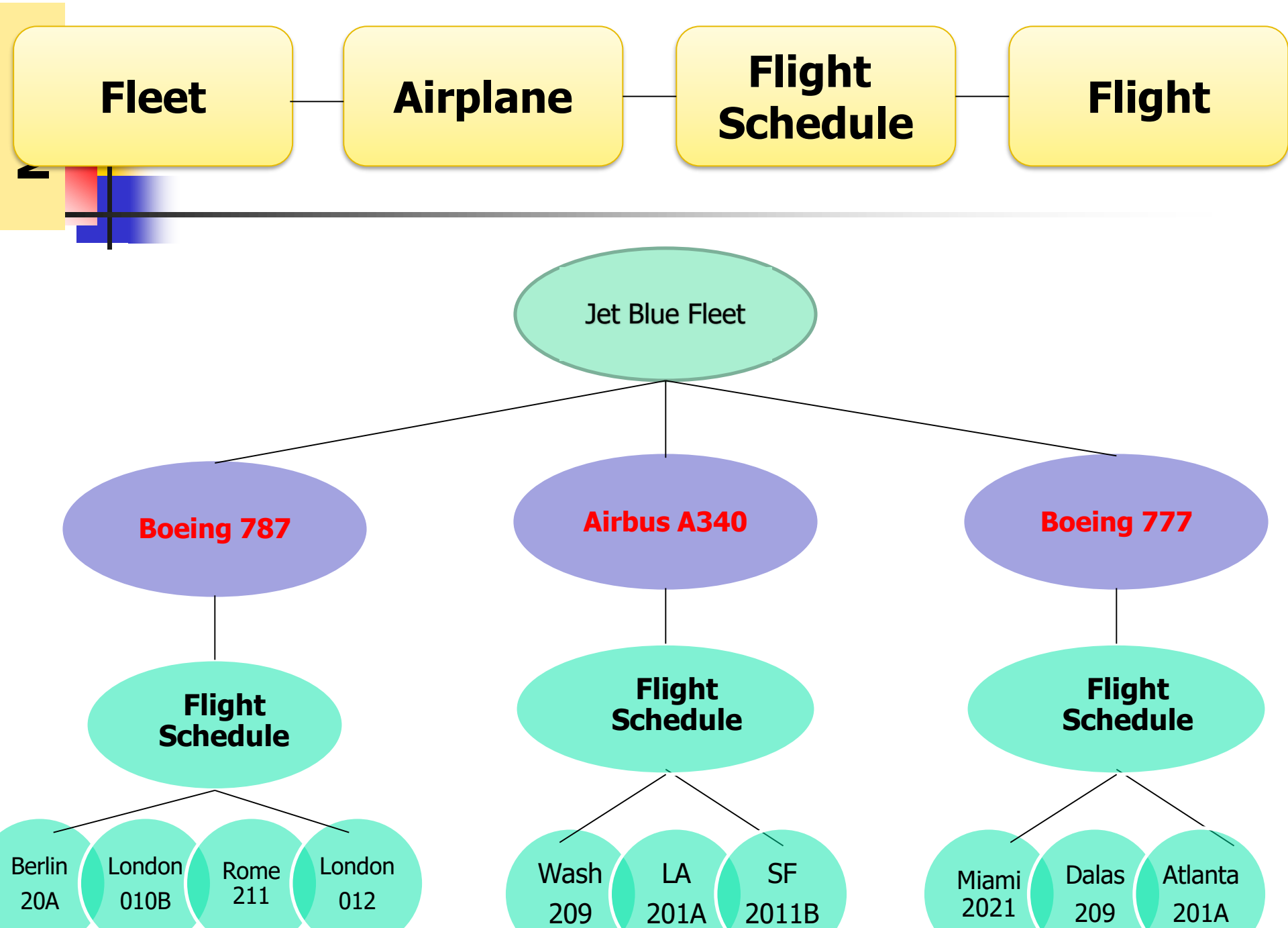
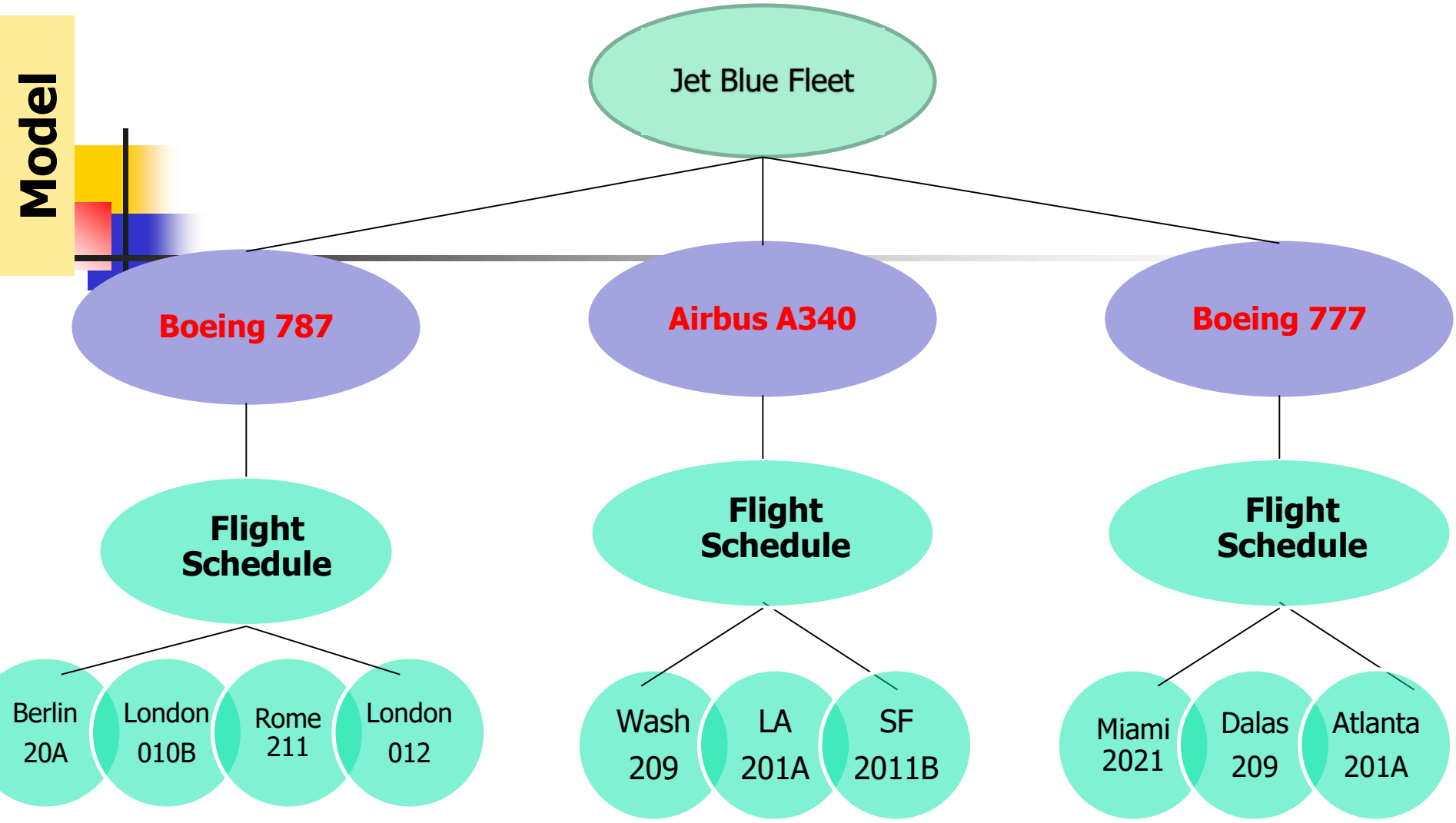
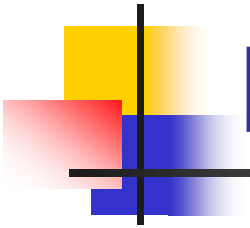
Patient
Patient Visit History
Visit
Instances
Joe the Patient
Visit History
Visit 2010A
Visit 2010B
Visit 2011
Visit 2012
Instances
Anna the Patient
Visit History
Visit 2008
Visit 2009
Visit 2011A
Visit 2011B


Model
Airplane
Flight Schedule
Flight
Instances
Boeing 787
Flight Schedule
Berlin 20A
London 010B
Rome 211
London 012
Instances
Airbus A340
Flight Schedule
Boston 2021
Wash 209
LA 201A
SF 2011B


Fleet
Airplane
Flight Schedule
Flight
Jet Blue Fleet
Boeing 787
Airbus A340
Boeing 777
Flight Schedule
Flight Schedule
Flight Schedule
Berlin 20A
London 010B
Rome 211
London 012
Wash 209
LA 201A
SF 2011B
Miami 2021
Dalas 209
Atlanta 201A

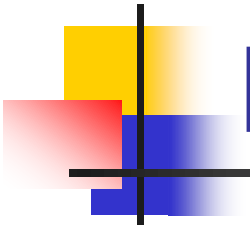
Model


Jet Blue Fleet
Boeing 787
Airbus A340
Boeing 777
Flight Schedule
Flight Schedule
Flight Schedule
Berlin 20A
London 010B
Rome 211
London 012
Wash 209
LA 201A
SF 2011B
Miami 2021
Dalas 209
Atlanta 201A



How Java will do this?

- Classes so we define what each class means (for example flight handles the smarts of how to deal with empty and available seats)
- Objects so we fill them with data that distinguish things
- Array Lists to do two things
  - glue objects together

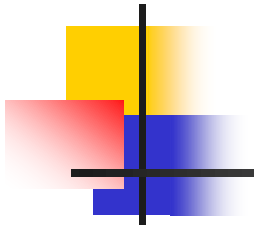


How Java will do this?

- Arrays to do two things
  - glue components together
  - Relate one component to many components
    - For example an array is needed
      - a flight to house many empty seats
      - Medication history to keep track of multiple medications for a patient

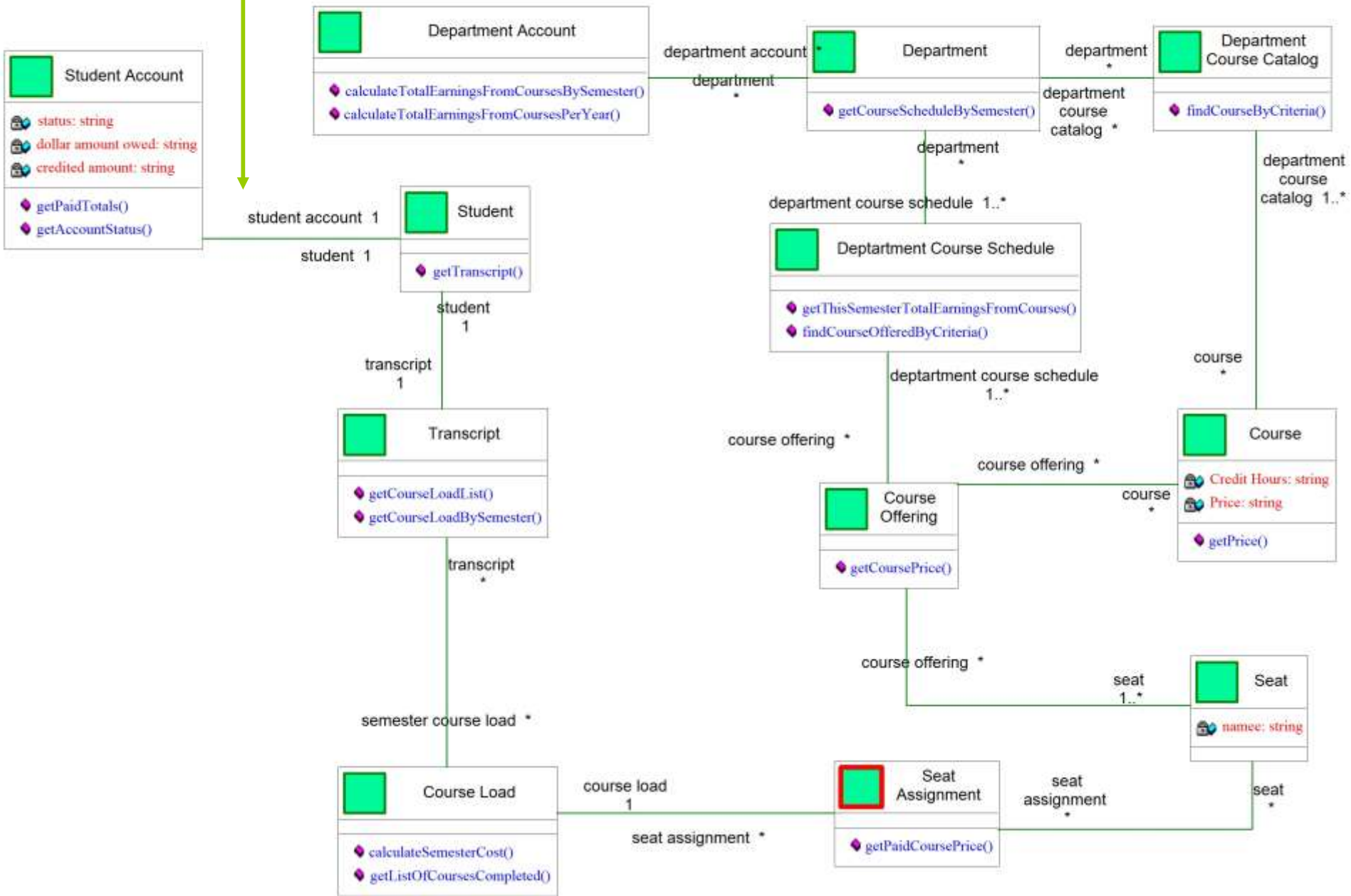
How to implement this pattern in java?

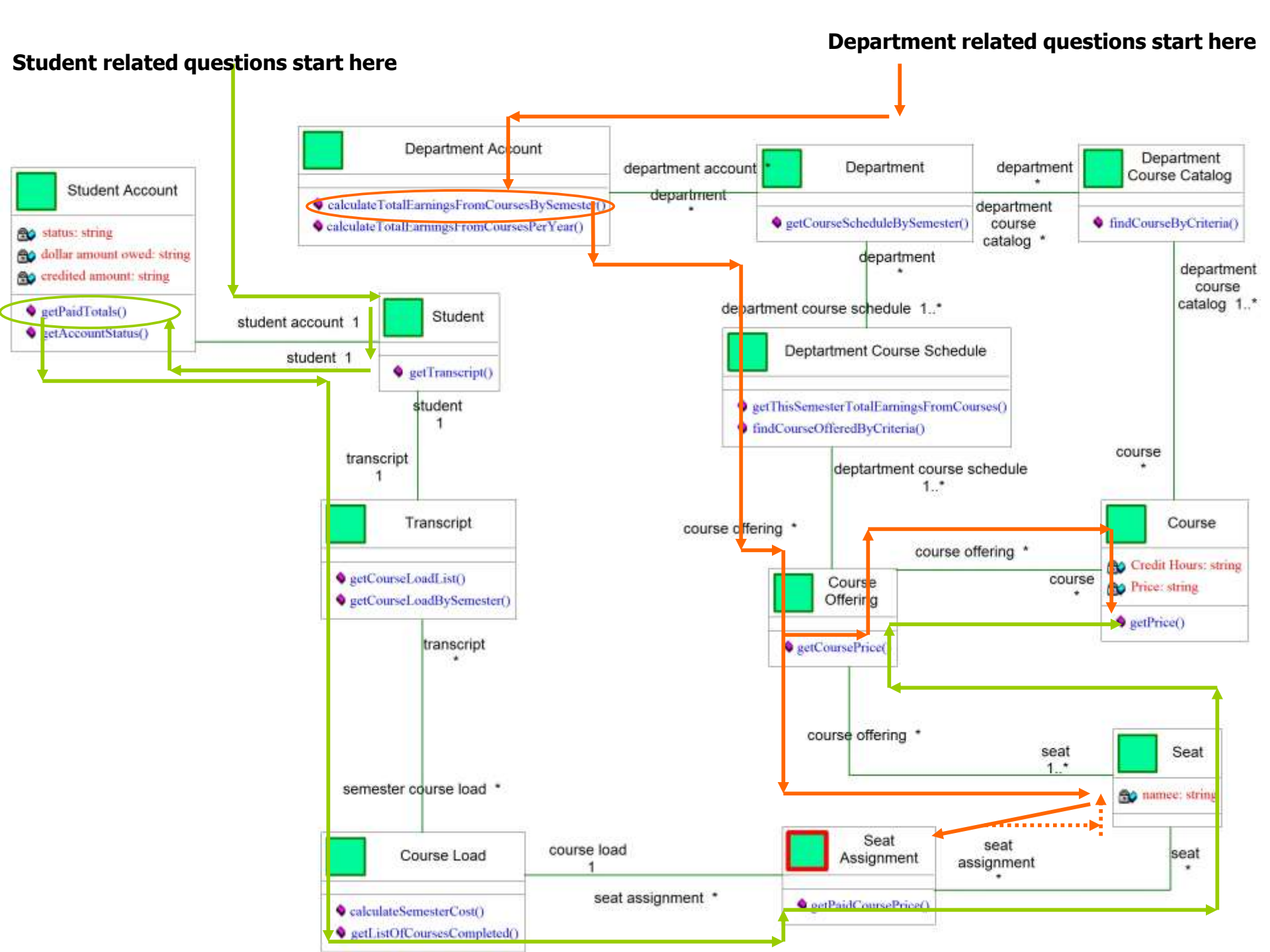
- Define Java class for the product catalog
- Define a java class for product
- The product catalog class must keep track of products
  - How?

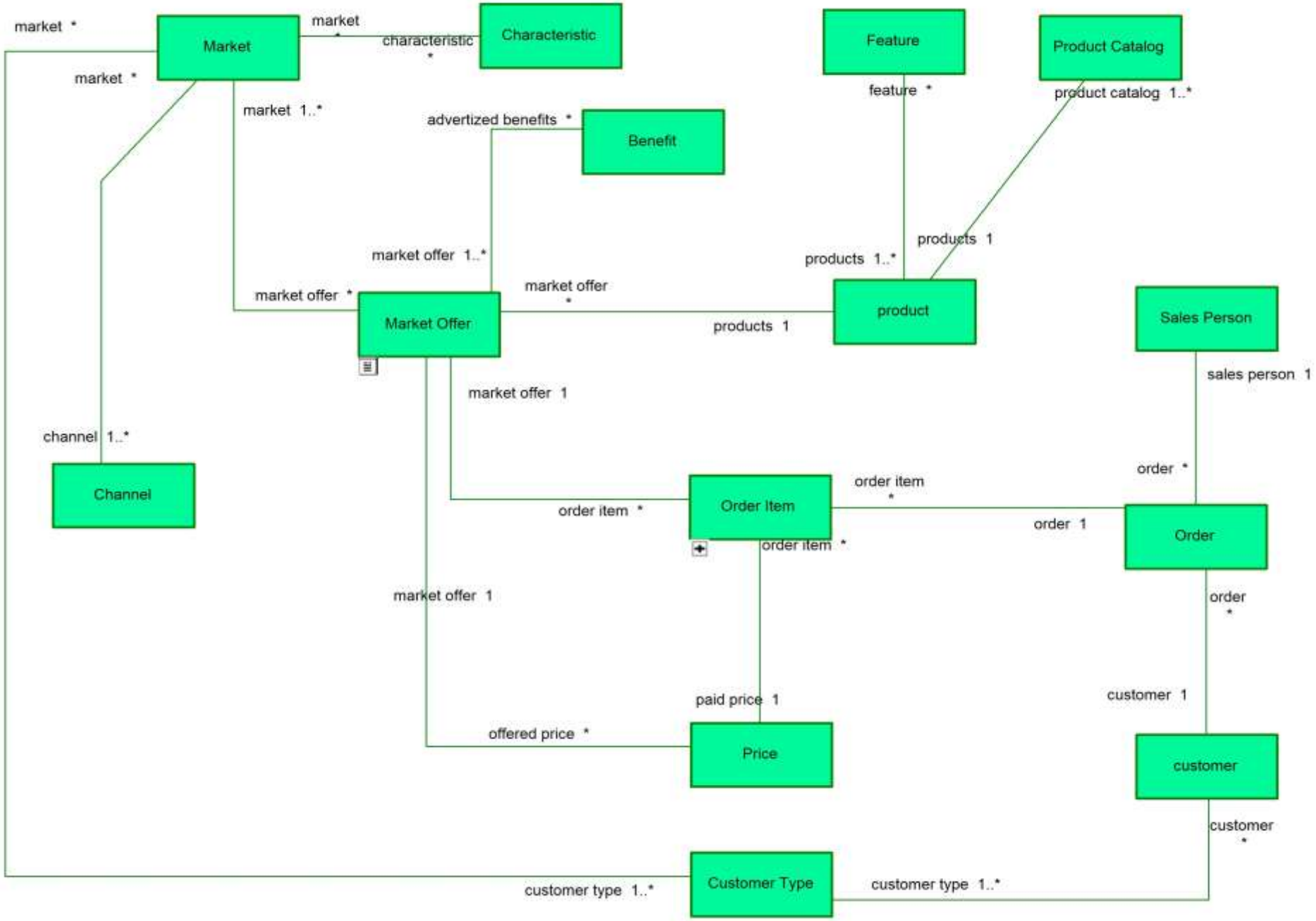


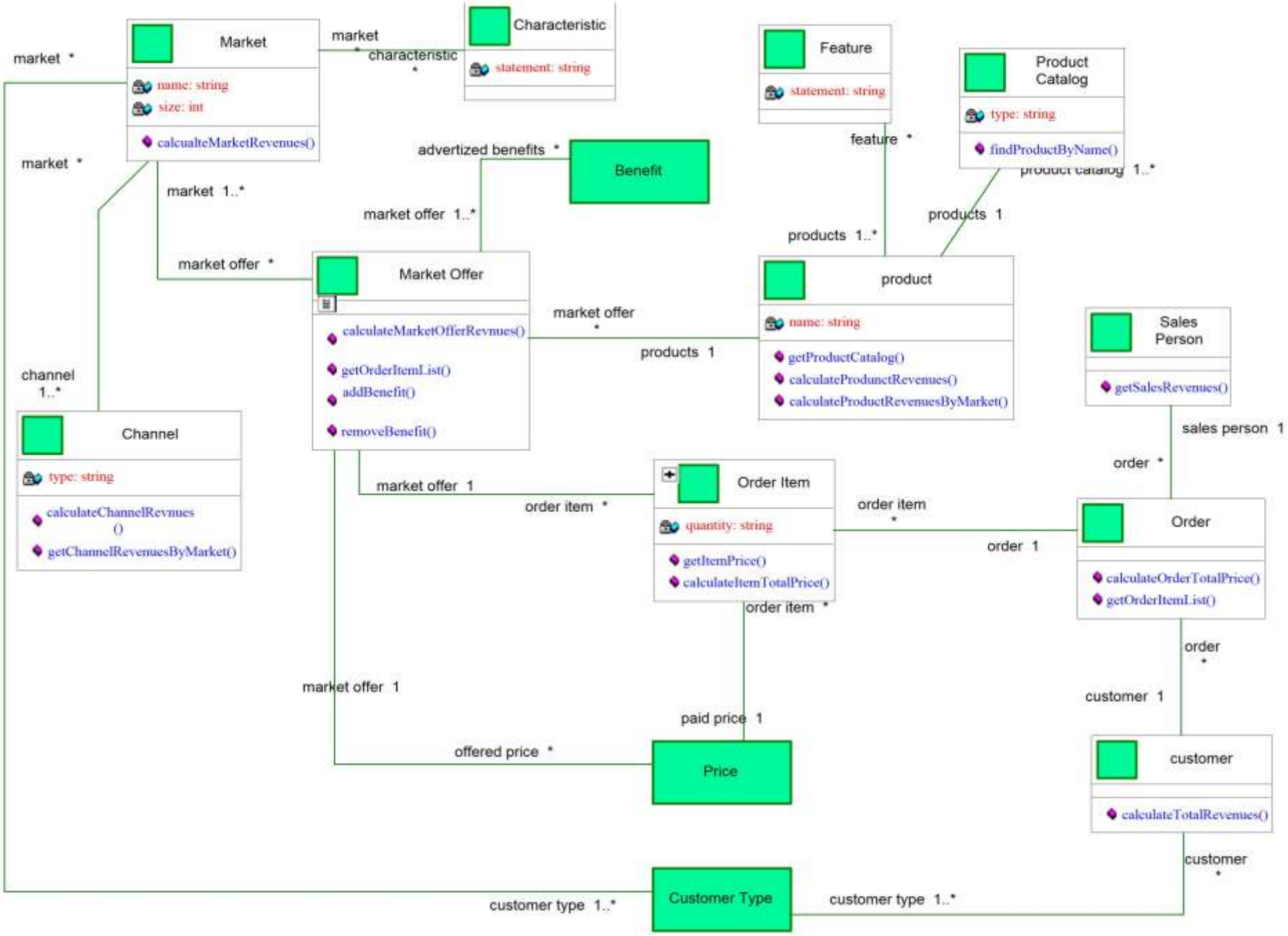
Why learning how to implement relationship connections are important?

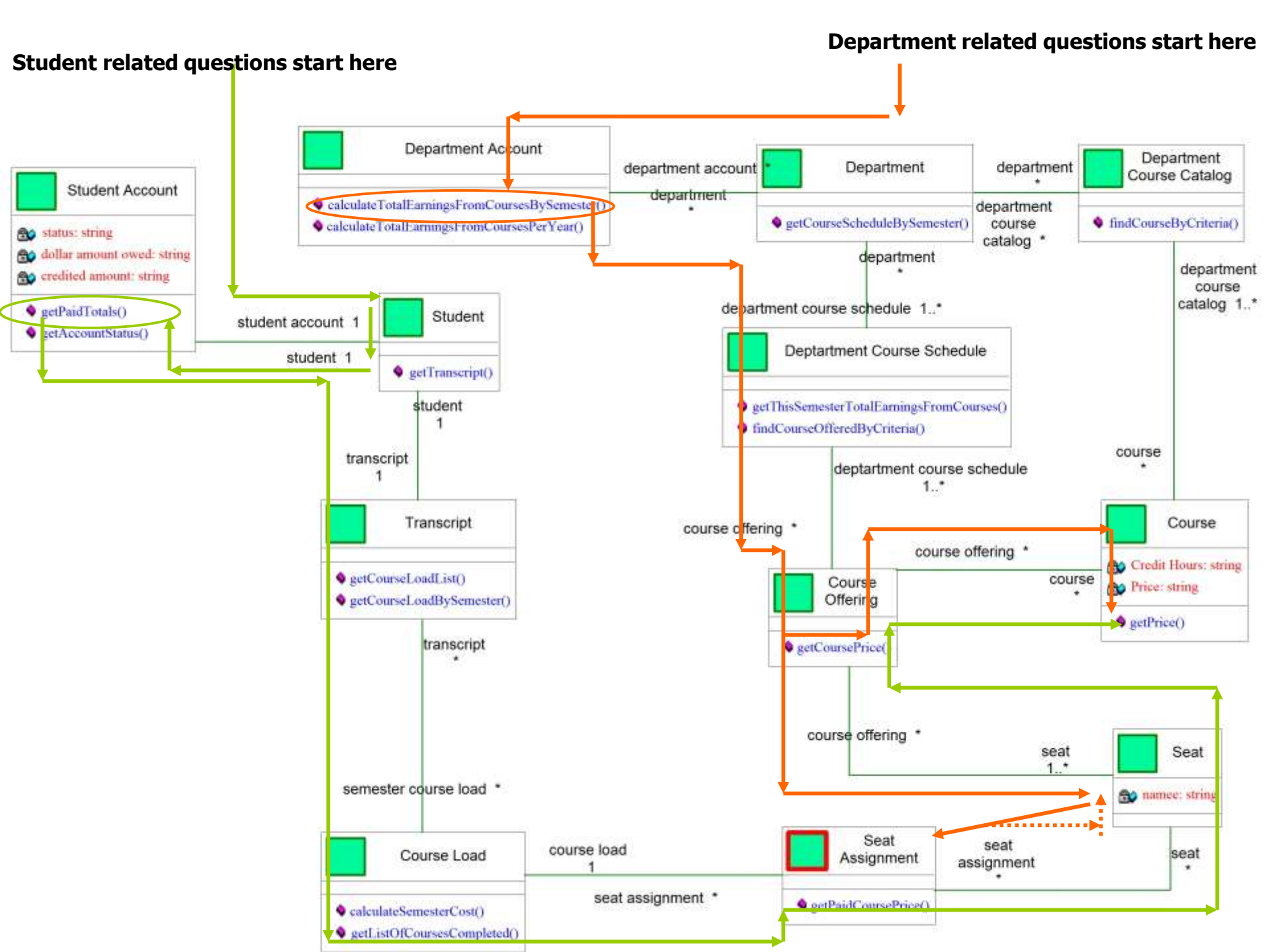
Student related questions start here




Student related questions start here
Department related questions start here
Department Account
calculateTotalEarningsFromCoursesBySemester()
calculateTotalEarningsFromCoursesPerYear()
Department
getCourseScheduleBySemester()
Department Course Catalog
findCourseByCriteria()
department account
department
department
department course catalog
department
department course catalog 1..*
Student Account
status: string
dollar amount owed: string
credited amount: string
getPaidTotals()
getAccountStatus()
student account 1
student 1
Student
getTranscript()
student
1
transcript
1
department course schedule 1..*
Deptartment Course Schedule
getThisSemesterTotalEarningsFromCourses()
findCourseOfferedByCriteria()
deptartment course schedule
1..*
course
*
Transcript
getCourseLoadList()
getCourseLoadBySemester()
transcript
*
course offering *
Course Offering
getCoursePrice()
course offering *
course
*
Course
Credit Hours: string
Price: string
getPrice()
course offering *
seat
1..*
Seat
namee: string
semester course load *
Course Load
calculateSemesterCost()
getListOfCoursesCompleted()
course load
1
seat assignment *
Seat Assignment
getPaidCoursePrice()
seat assignment
*
seat
*


market *
Market
market
*
characteristic
*
Characteristic
Feature
Product Catalog
market *
market 1..*
feature *
product catalog 1..*
advertized benefits *
Benefit
market offer 1..*
products 1..*
products 1
market offer *
market offer
*
Market Offer
products 1
product
Sales Person
sales person 1
market offer 1
channel 1..*
Channel
order *
order item
*
order item *
Order Item
order 1
Order
order item *
market offer 1
order
*
customer 1
paid price 1
offered price *
Price
customer
customer
*
customer type 1..*
Customer Type
customer type 1..*


Market
name: string
size: int
calcualteMarketRevenues()
Characteristic
statement: string
market
characteristic
market *
market *
market 1..*
Benefit
advertized benefits *
market offer 1..*
Feature
statement: string
feature *
Product Catalog
type: string
findProductByName()
product catalog 1..*
products 1
products 1..*
market offer *
Market Offer
calculateMarketOfferRevnues()
getOrderItemList()
addBenefit()
removeBenefit()
market offer
*
products 1
product
name: string
getProductCatalog()
calculateProdunctRevenues()
calculateProductRevenuesByMarket()
Sales Person
getSalesRevenues()
sales person 1
order *
channel
1..*
Channel
type: string
calculateChannelRevnues
()
getChannelRevenuesByMarket()
market offer 1
order item *
Order Item
quantity: string
getItemPrice()
calculateItemTotalPrice()
order item
*
order 1
Order
calculateOrderTotalPrice()
getOrderItemList()
order item *
order
*
customer 1
market offer 1
paid price 1
offered price *
Price
customer
calculateTotalRevenues()
customer
*
customer type 1..*
Customer Type
customer type 1..*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student
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transcript
1
department course schedule 1..*
Deptartment Course Schedule
getThisSemesterTotalEarningsFromCourses()
findCourseOfferedByCriteria()
deptartment course schedule
1..*
course
*
Transcript
getCourseLoadList()
getCourseLoadBySemester()
transcript
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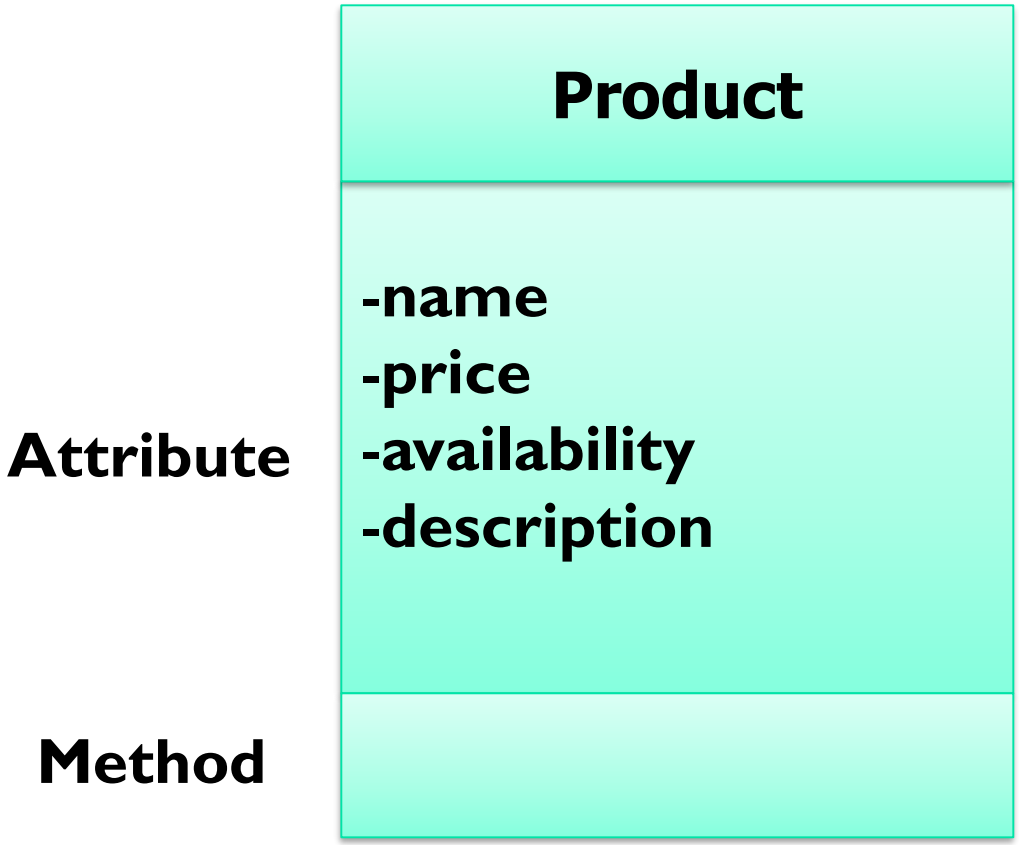
course offering *
Course Offering
getCoursePrice()
course offering *
course
*
Course
Credit Hours: string
Price: string
getPrice()
course offering *
seat
1..*
Seat
namee: string
semester course load *
Course Load
calculateSemesterCost()
getListOfCoursesCompleted()
course load
1
seat assignment *
Seat Assignment
getPaidCoursePrice()
seat assignment
*
seat
*

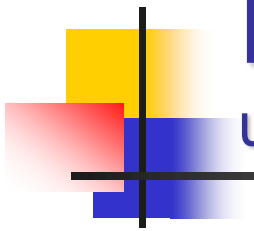
Create Product Class

under the business package



ProductCatalog Class

under the business package



Attribute

Method

ProductCatalog
name: String **lastUpdated: String** **description: String** **products: List of products**
newProduct(): returns a new empty product **FindProduct(ProductId:String)** **getProductList(): returns list of all products**

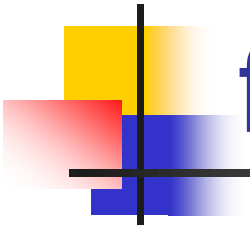
ProductCatalog Class

under the business package

The newProduct() method does the following:

1. **Uses the java new operator to create a product object**
2. **Saves internally as part of a list**
3. **Returns the obejct to the caller (requester)**

How the product catalog will flow through the screens?



When the mainjframe is first executed, we create an object of type productcatalog

We keep the product catalog object in the MainJFrame for the duration of the application

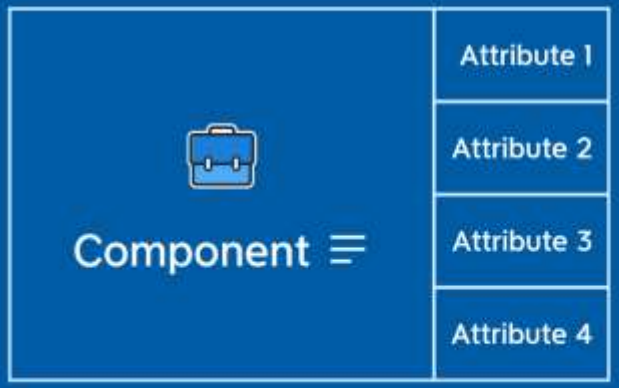
When user wants to add a product we send the product catalog object to the add product screen

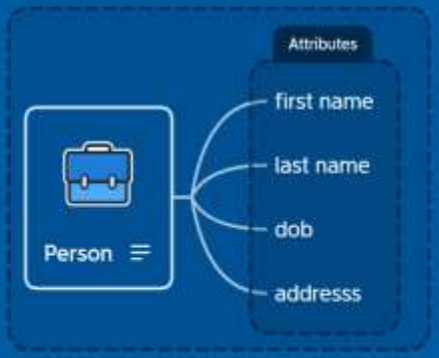
The product screen will use the product catalog object to create new product and fill it with input from the user.

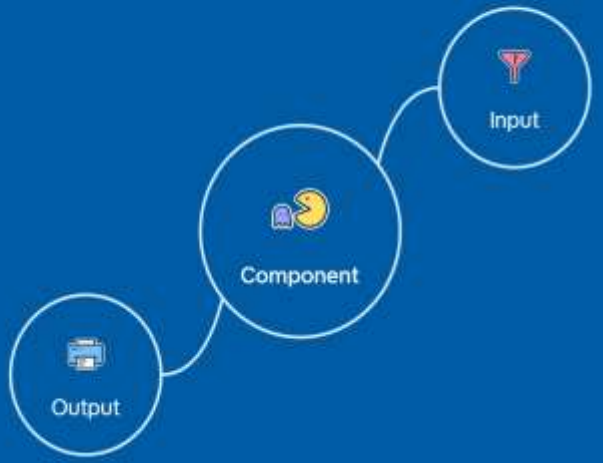
The catalog should how to save the newly created product in its list of products

Aspects of Components

Component Definition







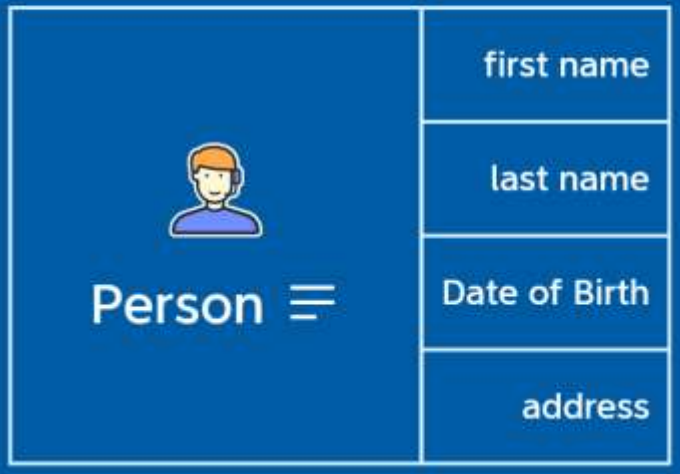
A component represents a modular part of a system that encapsulates the state of the data as well as how the component would react (behavior)

Working with components:

0) Define the component with all its attributes
1) Create new (empty) Component
2) Push data into the component (storage)
3) Extract data out of the component

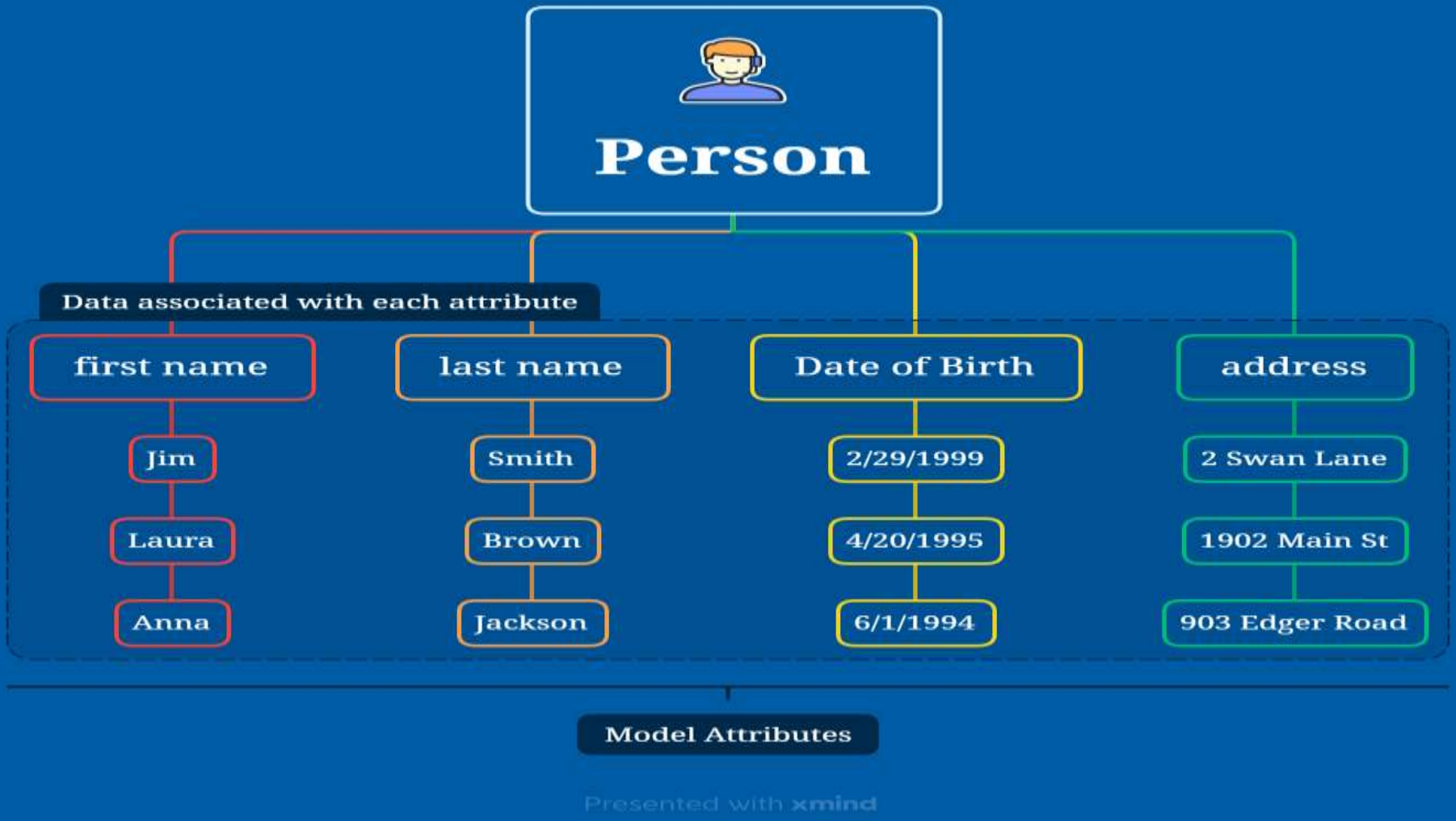
Component Example

A person is defined as by attributes like first name, last name, dob, and address



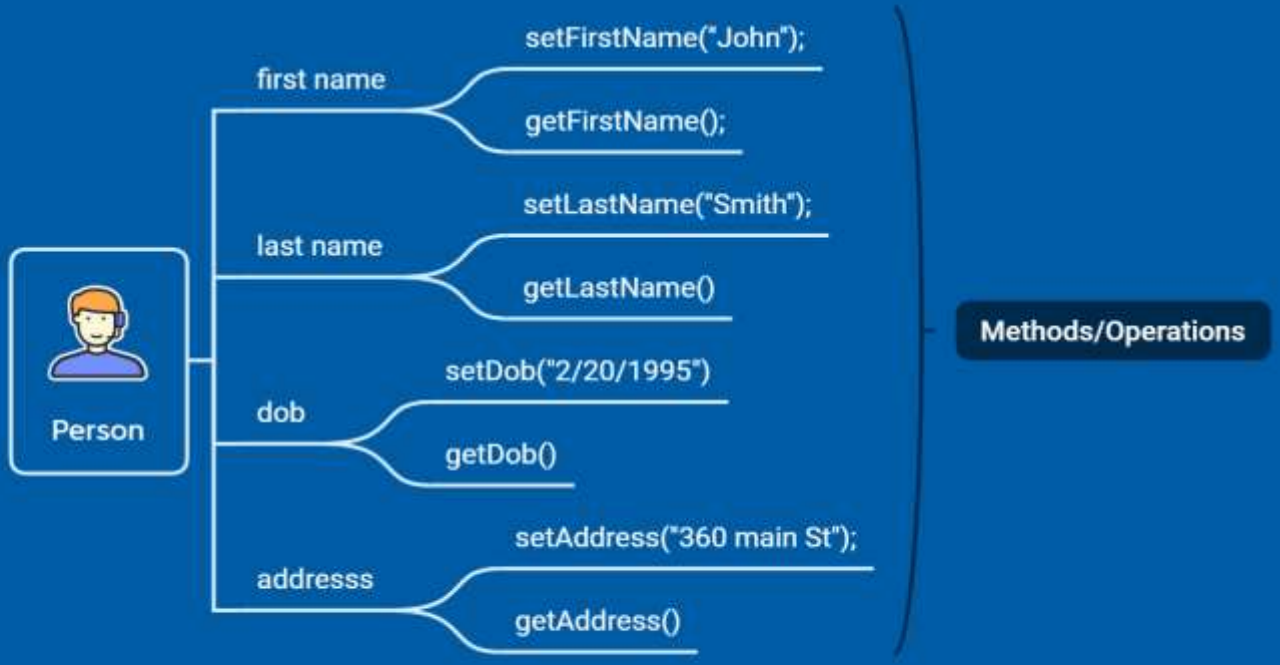
Data In and Out

Component (class) with many instances

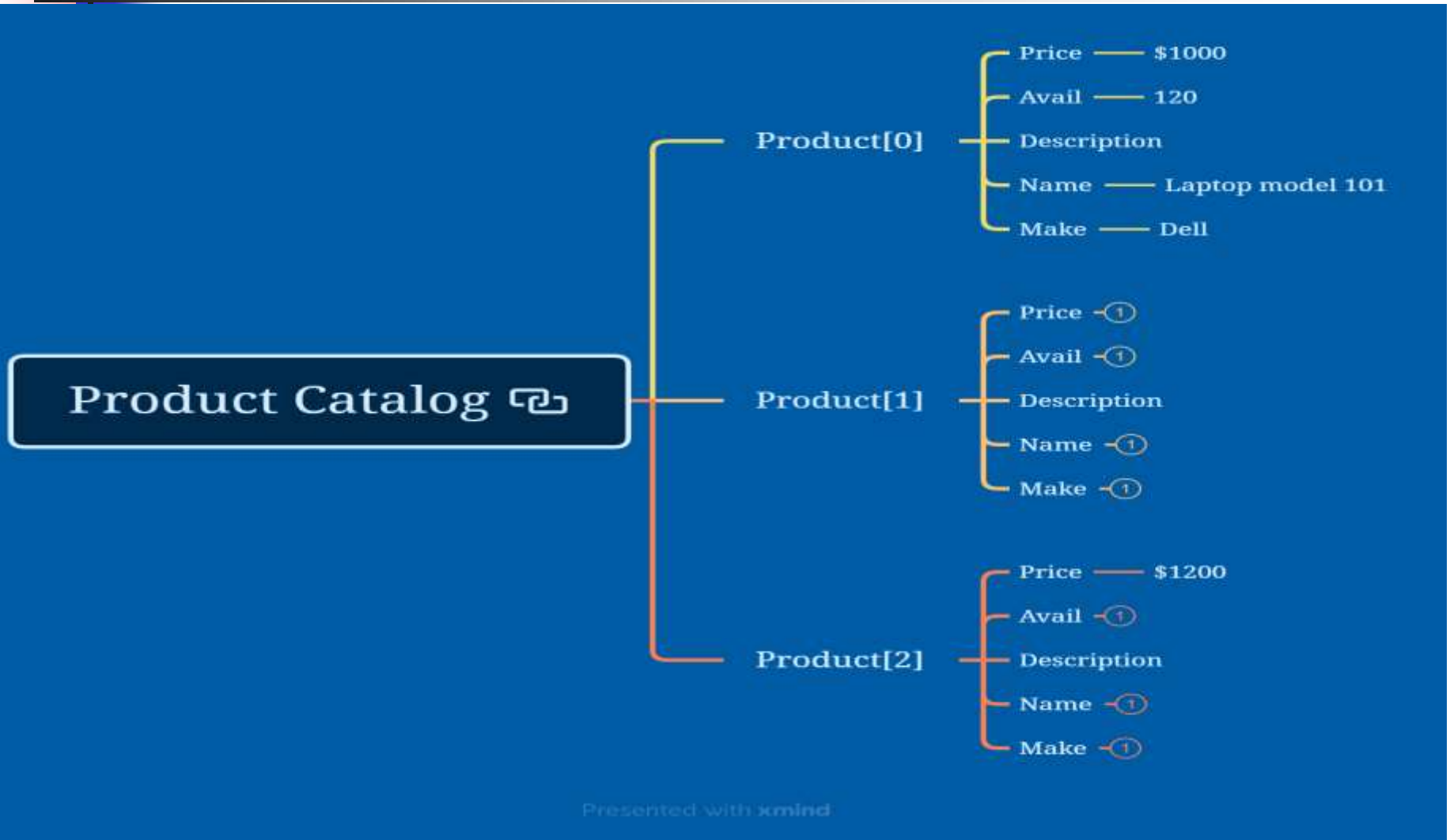


Methods for moving data in/out of component

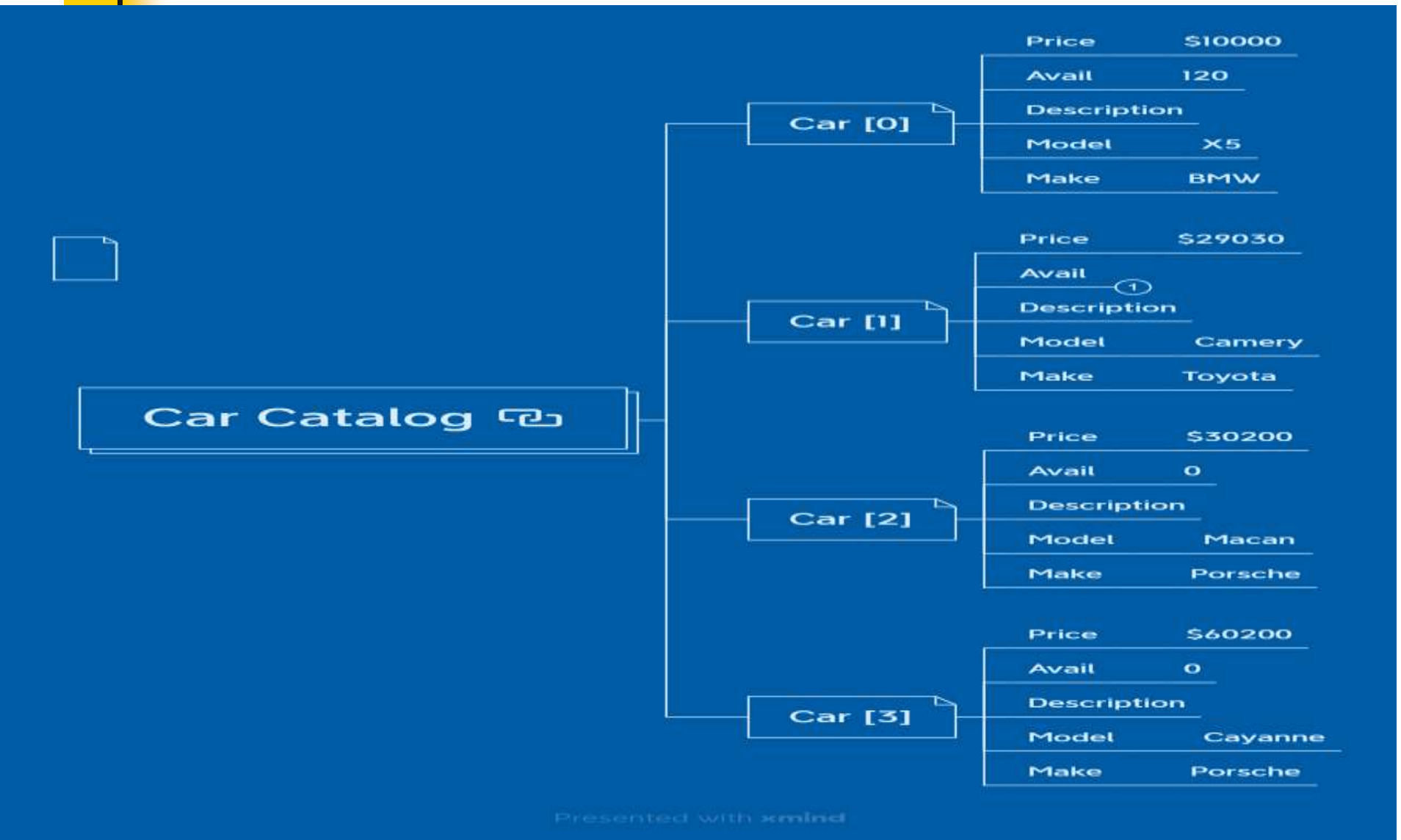
Methods give us ways to push data into the component as well as mechanism for extracting data out of the component

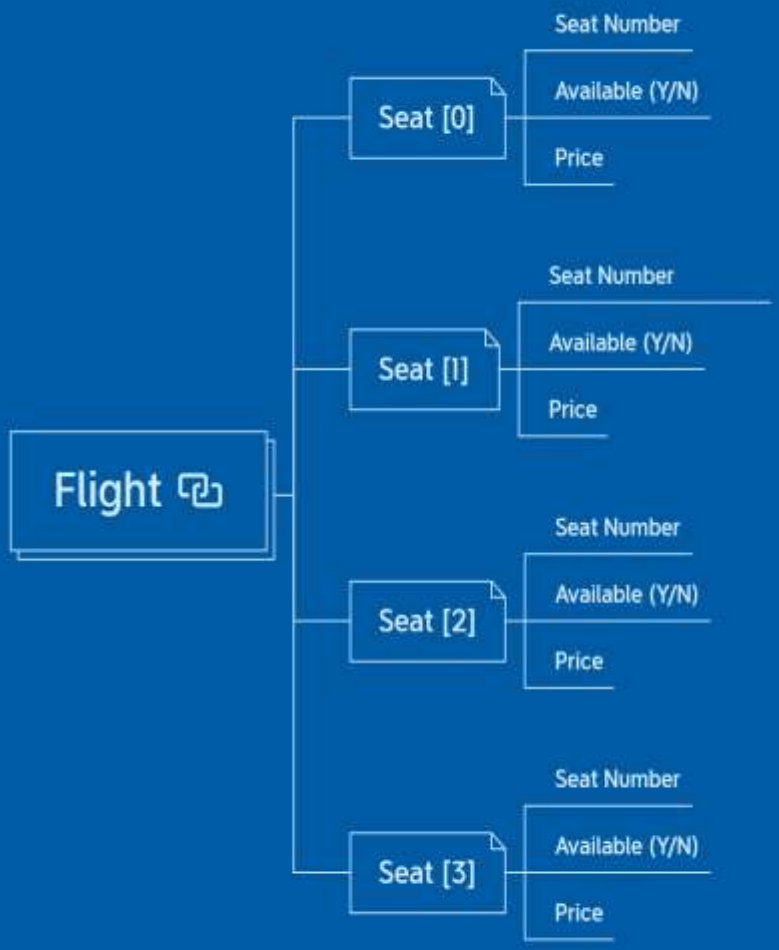


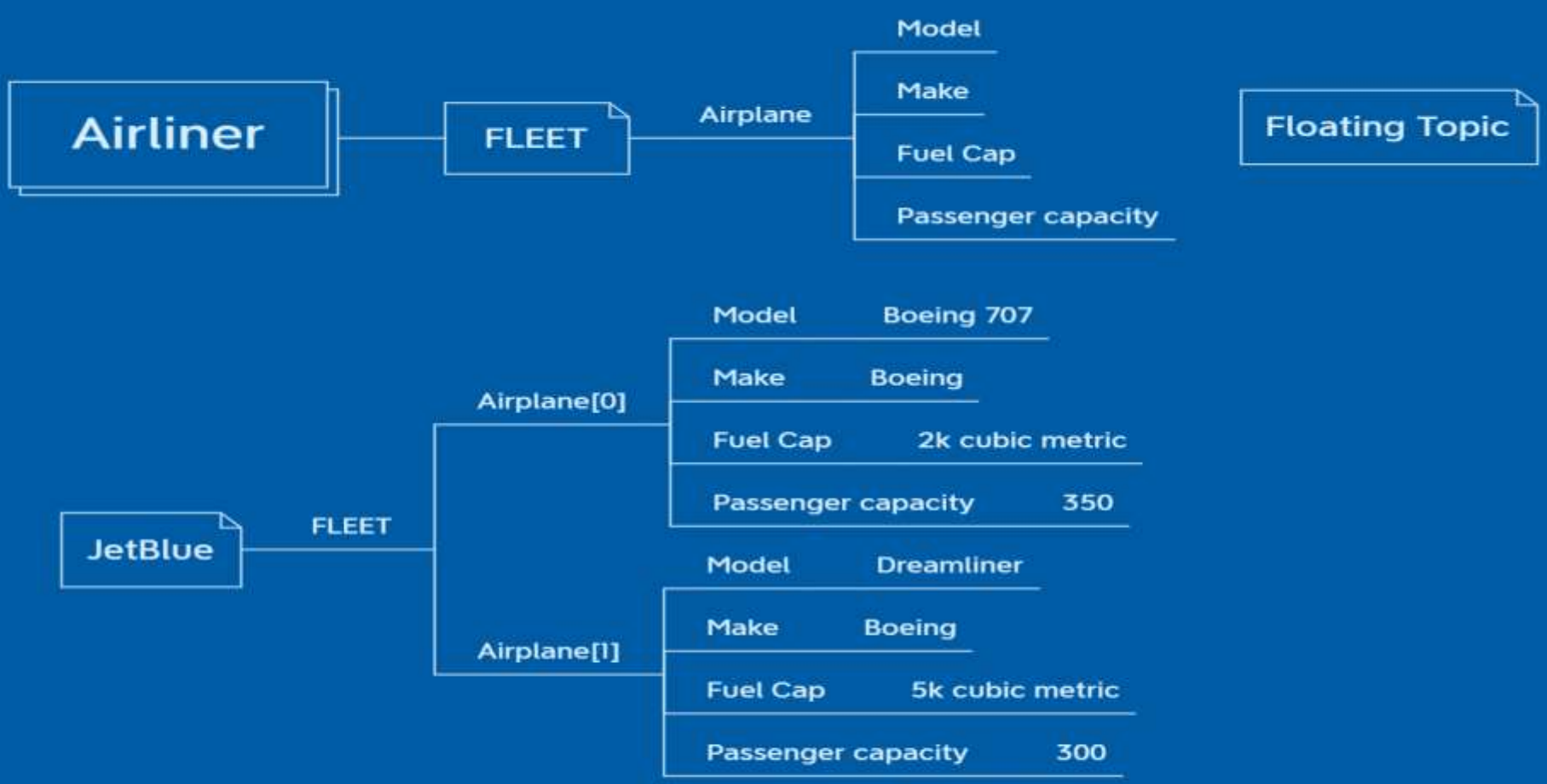
Product Catalog with 3 indexed product instances



Car Catalog containing instances of car components






Airliner
FLEET
Airplane
Model
Make
Fuel Cap
Passenger capacity
Floating Topic
JetBlue
FLEET
Airplane[0]
Model Boeing 707
Make Boeing
Fuel Cap 2k cubic metric
Passenger capacity 350
Airplane[1]
Model Dreamliner
Make Boeing
Fuel Cap 5k cubic metric
Passenger capacity 300
Presented with xmind


Flight Schedule
Flight [0]
number 100
Source London
Destination
Crew
Flight [1]
number 202
Source 1
Destination
Crew
Flight [2]
number $021
Source 1
Destination
Crew 1
Presented with xmind


Medication History
Medication History
Medication [0]
Price $10000
Avail 120
Description
Name Covid 19 Vaccine
Manufacturer J&J
Medication [1]
Price $202
Avail 1
Description
Name Coved 19-Vaccine
Manufacturer pfizer
Medication [2]
Price $300
Avail 0
Description
Name Coved 19-Vaccine
Manufacturer Moderna
Medication[3]
Medication [4]
Price $303
Avail 102
Description
Name Coved 19-Vaccine-Booster1
Manufacturer pfizer