

# 预定类面向对象设计

文泰来 老师



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# Restaurant

- Can you design a restaurant?



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- What
- How

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- What

关键字: Restaurant

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- What

关键字: Restaurant

In / Out: ?

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- What

关键字: Restaurant

In / Out :

Party / Table



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- What

关键字: Restaurant, Party, Table

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# What

关键字: Restaurant

属性: ?

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# What

关键字： Restaurant



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# What

关键字：Restaurant



- 吧台



- 大堂



- 包间

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# What

关键字：Restaurant



- 桌子的规格不一样，能坐的人数区别
- 吧台里，party的区分
- 收费？

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- 针对本题

大堂, 所有桌子都一样, 暂不考虑人数限制

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- How

规则？

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- How



- 是否能够预约?

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## - How



## - 是否能够送外卖?

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## - How



- 每个Order需要区分是Dine-in还是Dine-out

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- 针对本题

没有Reservation

没有Dine-out

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思考模式1:

Party 进入餐馆 -> Host指引到空桌 (find table) ->  
一个waiter负责这桌客人 (assign waiter) -> 客人点菜 (take order)  
Chef 拿到order, 按顺序做菜 (cook by order) -> Order侍者 (serve order) -> 客人吃完后付钱 (check out)



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## 思考模式2:

1. 客人进入餐馆，餐馆返回一个Table
2. 客人点菜，餐馆返回一桌菜
3. 客人付账，餐馆清空Table



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## 思考模式1:



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## 思考模式2:



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Restaurant

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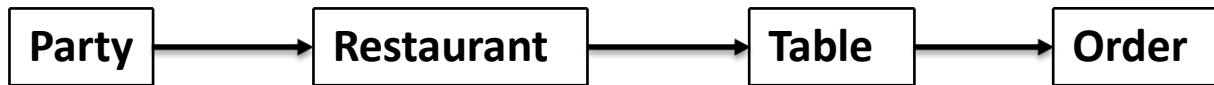




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Party

Restaurant
- List<Table> tables

Table

Order

Meal

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Party

Restaurant
<ul style="list-style-type: none"><li>- List&lt;Table&gt; tables</li><li>- List&lt;Meal&gt; menu</li></ul>

Table

Order

Meal

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Party

Restaurant
<ul style="list-style-type: none"><li>- List&lt;Table&gt; tables</li><li>- List&lt;Meal&gt; menu</li></ul>

Table
<ul style="list-style-type: none"><li>- Party p</li></ul>

Order

Meal

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Party

Restaurant
<ul style="list-style-type: none"><li>- List&lt;Table&gt; tables</li><li>- List&lt;Meal&gt; menu</li></ul>

Table

Order

Meal

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Party

Restaurant
<ul style="list-style-type: none"><li>- List&lt;Table&gt; tables</li><li>- List&lt;Meal&gt; menu</li></ul>

Table

Order
<ul style="list-style-type: none"><li>- List&lt;Meal&gt; meals</li></ul>

Meal

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- Party

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- Party
- Make order ?

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- Restaurant

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- Restaurant
- Find table

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- Restaurant
  - Find table
  - Take Order

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- Restaurant
  - Find table
  - Take Order
  - Checkout

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- Table

- N/A

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- Order

- N/A

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- Meal

- N/A

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# Use case summary

---



- Management 类常见use case

Reserve: Serve: Checkout:

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# Use case summary

---



- Mangement 类常见use case

Reserve: 暂不考虑

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# Use case summary

---



- Management 类常见use case

Reserve: 暂不考虑

Serve: Find table, Take order

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# Use case summary

---

- Management 类常见use case

Reserve: 暂不考虑

Serve: Find table, Take order

Checkout: checkout

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Party

Restaurant
- List<Table> tables - List<Meal> menu

Table

Order
- List<Meal> meals

Meal

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ases

- Use case: Find table
- Restaurant find an available table, and change the table to be unavailable

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Party

Restaurant
- List<Table> tables - List<Meal> menu
+ Table findTable()

Table

Order
- List<Meal> meals

Meal

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Party

Restaurant
- List<Table> tables - List<Meal> menu
+ Table findTable()

Table
- Boolean available

Order
- List<Meal> meals

Meal

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Party

Restaurant
- List<Table> tables - List<Meal> menu
+ Table findTable()

Table
- Boolean available
+ boolean isAvailable()

Order
- List<Meal> meals

Meal

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Party

Restaurant
- List<Table> tables - List<Meal> menu
+ Table findTable()

Table
- Boolean available
+ boolean isAvailable() + void changeStatus()

Order
- List<Meal> meals

Meal

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# Best practice

Party

Restaurant
- List<Table> tables - List<Meal> menu
+ Table findTable()

Table
- Boolean available
+ boolean isAvailable() + void changeStatus()

Order
- List<Meal> meals

Meal

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Party

Restaurant
- List<Table> tables - List<Meal> menu
+ Table findTable()

Table
- Boolean available
+ boolean isAvailable() + void markUnavailable()

Order
- List<Meal> meals

Meal

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- Use case: Take order
- Restaurant takes an order

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Party

Restaurant
- List<Table> tables - List<Meal> menu
+ Table findTable() + void takeOrder(Order o)

Table
- Boolean available
+ boolean isAvailable() + void markUnavailable()

Order
- List<Meal> meals

Meal

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- Use case: Check out
  - Restaurant checks out a table/order, mark the table available again
  - Calculate order price

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Party

Restaurant
<ul style="list-style-type: none"><li>- List&lt;Table&gt; tables</li><li>- List&lt;Meal&gt; menu</li></ul>
<ul style="list-style-type: none"><li>+ Table findTable()</li><li>+ void takeOrder(Order o)</li></ul>

Table
<ul style="list-style-type: none"><li>- Boolean available</li></ul>
<ul style="list-style-type: none"><li>+ boolean isAvailable()</li><li>+ void markUnavailable()</li></ul>

Order
<ul style="list-style-type: none"><li>- List&lt;Meal&gt; meals</li></ul>

Meal

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Party

Restaurant
<ul style="list-style-type: none"><li>- List&lt;Table&gt; tables</li><li>- List&lt;Meal&gt; menu</li></ul>
<ul style="list-style-type: none"><li>+ Table findTable()</li><li>+ void takeOrder(Order o)</li></ul>

Table
<ul style="list-style-type: none"><li>- Boolean available</li></ul>
<ul style="list-style-type: none"><li>+ boolean isAvailable()</li><li>+ void markUnavailable()</li></ul>

Order
<ul style="list-style-type: none"><li>- List&lt;Meal&gt; meals</li><li>- Table t</li></ul>

Meal

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Party

Restaurant
<ul style="list-style-type: none"><li>- List&lt;Table&gt; tables</li><li>- List&lt;Meal&gt; menu</li></ul>
<ul style="list-style-type: none"><li>+ Table findTable()</li><li>+ void takeOrder(Order o)</li><li>+ void checkout(Order o)</li></ul>

Table
<ul style="list-style-type: none"><li>- Boolean available</li></ul>
<ul style="list-style-type: none"><li>+ boolean isAvailable()</li><li>+ void markUnavailable()</li></ul>

Order
<ul style="list-style-type: none"><li>- List&lt;Meal&gt; meals</li><li>- Table t</li></ul>

Meal

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Party

Restaurant
<ul style="list-style-type: none"><li>- List&lt;Table&gt; tables</li><li>- List&lt;Meal&gt; menu</li></ul>
<ul style="list-style-type: none"><li>+ Table findTable()</li><li>+ void takeOrder(Order o)</li><li>+ void checkout(Order o)</li></ul>

Table
<ul style="list-style-type: none"><li>- Boolean available</li></ul>
<ul style="list-style-type: none"><li>+ boolean isAvailable()</li><li>+ void markUnavailable()</li><li>+ void markAvailable()</li></ul>

Order
<ul style="list-style-type: none"><li>- List&lt;Meal&gt; meals</li><li>- Table t</li></ul>

Meal

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Party
-------

Restaurant
- List<Table> tables - List<Meal> menu
+ Table findTable() + void takeOrder(Order o) + void checkout(Order o)

Table
- Boolean available
+ boolean isAvailable() + void markUnavailable() + void markAvailable()

Order
- List<Meal> meals - Table t

Meal
- Float price
+ float getPrice()

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Party

Restaurant
<ul style="list-style-type: none"><li>- List&lt;Table&gt; tables</li><li>- List&lt;Meal&gt; menu</li></ul>
<ul style="list-style-type: none"><li>+ Table findTable()</li><li>+ void takeOrder(Order o)</li><li>+ void checkout(Order o)</li></ul>

Table
<ul style="list-style-type: none"><li>- Boolean available</li></ul>
<ul style="list-style-type: none"><li>+ boolean isAvailable()</li><li>+ void markUnavailable()</li><li>+ void markAvailable()</li></ul>

Order
<ul style="list-style-type: none"><li>- List&lt;Meal&gt; meals</li><li>- Table t</li></ul>
<ul style="list-style-type: none"><li>+ float getPrice()</li></ul>

Meal
<ul style="list-style-type: none"><li>- Float price</li></ul>
<ul style="list-style-type: none"><li>+ float getPrice()</li></ul>

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Party
-------

Restaurant
- List<Table> tables - List<Meal> menu
+ Table findTable() + void takeOrder(Order o) + void checkout(Order o)

Table
- Boolean available
+ boolean isAvailable() + void markUnavailable() + void markAvailable()

Order
- List<Meal> meals - Table t - Party p
+ float getPrice()

Meal
- Float price
+ float getPrice()

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# Challenge

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- Share table?

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Party

Restaurant
<ul style="list-style-type: none"><li>- List&lt;Table&gt; tables</li><li>- List&lt;Meal&gt; menu</li><li>- Map&lt;Table, List&lt;Order&gt;&gt; orders</li></ul>
<ul style="list-style-type: none"><li>+ Table findTable()</li><li>+ void takeOrder(Order o)</li><li>+ void checkout(Order o)</li></ul>

Table
<ul style="list-style-type: none"><li>- Boolean available</li></ul>
<ul style="list-style-type: none"><li>+ boolean isAvailable()</li><li>+ void markUnavailable()</li><li>+ void markAvailable()</li></ul>

Order
<ul style="list-style-type: none"><li>- List&lt;Meal&gt; meals</li><li>- Table t</li><li>- Party p</li></ul>
<ul style="list-style-type: none"><li>+ float getPrice()</li></ul>

Meal
<ul style="list-style-type: none"><li>- Float price</li></ul>
<ul style="list-style-type: none"><li>+ float getPrice()</li></ul>

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Party

Restaurant
<ul style="list-style-type: none"><li>- List&lt;Table&gt; tables</li><li>- List&lt;Meal&gt; menu</li><li>- Map&lt;Table, List&lt;Order&gt;&gt; orders</li></ul>
<ul style="list-style-type: none"><li>+ Table findTable()</li><li>+ void takeOrder(Order o)</li><li>+ void checkout(Order o)</li></ul>

Table
<ul style="list-style-type: none"><li>- Boolean available</li><li>- Int availableSeats</li></ul>
<ul style="list-style-type: none"><li>+ boolean isAvailable()</li></ul>

Order
<ul style="list-style-type: none"><li>- List&lt;Meal&gt; meals</li><li>- Table t</li><li>- Party p</li></ul>
<ul style="list-style-type: none"><li>+ float getPrice()</li></ul>

Meal
<ul style="list-style-type: none"><li>- Float price</li></ul>
<ul style="list-style-type: none"><li>+ float getPrice()</li></ul>

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Party
- Int size

Restaurant
<ul style="list-style-type: none"><li>- List&lt;Table&gt; tables</li><li>- List&lt;Meal&gt; menu</li><li>- Map&lt;Table, List&lt;Order&gt;&gt; orders</li></ul>
<ul style="list-style-type: none"><li>+ Table findTable()</li><li>+ void takeOrder(Order o)</li><li>+ void checkout(Order o)</li></ul>

Table
<ul style="list-style-type: none"><li>- Boolean available</li><li>- Int availableSeats</li></ul>
+ boolean isAvailable()

Order
<ul style="list-style-type: none"><li>- List&lt;Meal&gt; meals</li><li>- Table t</li><li>- Party p</li></ul>
+ float getPrice()

Meal
- Float price
+ float getPrice()

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Party
- Int size

Restaurant
<ul style="list-style-type: none"><li>- List&lt;Table&gt; tables</li><li>- List&lt;Meal&gt; menu</li><li>- Map&lt;Table, List&lt;Order&gt;&gt; orders</li></ul>
<ul style="list-style-type: none"><li>+ Table findTable(Party p)</li><li>+ void takeOrder(Order o)</li><li>+ void checkout(Order o)</li></ul>

Table
<ul style="list-style-type: none"><li>- Boolean available</li><li>- Int availableSeats</li></ul>
+ boolean isAvailable()

Order
<ul style="list-style-type: none"><li>- List&lt;Meal&gt; meals</li><li>- Table t</li><li>- Party p</li></ul>
+ float getPrice()

Meal
- Float price
+ float getPrice()

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Party

Restaurant
<ul style="list-style-type: none"><li>- List&lt;Table&gt; tables</li><li>- List&lt;Meal&gt; menu</li><li>- Map&lt;Table, List&lt;Order&gt;&gt; orders</li></ul>
<ul style="list-style-type: none"><li>+ Table findTable()</li><li>+ void takeOrder(Order o)</li><li>+ void checkout(Order o)</li></ul>

Table
<ul style="list-style-type: none"><li>- Boolean available</li></ul>
<ul style="list-style-type: none"><li>+ boolean isAvailable()</li><li>+ void markUnavailable()</li><li>+ void markAvailable()</li></ul>

Order
<ul style="list-style-type: none"><li>- List&lt;Meal&gt; meals</li><li>- Table t</li><li>- Party p</li></ul>
<ul style="list-style-type: none"><li>+ float getPrice()</li></ul>

Meal
<ul style="list-style-type: none"><li>- Float price</li></ul>
<ul style="list-style-type: none"><li>+ float getPrice()</li></ul>

NoTableException

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# Challenge

- How can you change your design to support reservation in your restaurant?



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- 预定类OOD题型
- 预定类OOD解题思路
- Hotel reservation system
- Booking.com

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- Restaurant reservation system

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- Restaurant reservation system
- Hotel reservation system

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- Restaurant reservation system
- Hotel reservation system
- Flight/Bus/Train reservation system

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- 频率：中

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- 频率：中
- 难度：高

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- What
  - 考虑预定的东西

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- What
  - 考虑预定的东西

例子：机票

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- What
  - 考虑预定的东西

例子：机票

机舱/座位号/...

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- Use case
  - Search
  - Select
  - Cancel

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- Use case

Search criteria -> Search() -> List<Result> -> Select() -> Receipt

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- 有哪些需要和面试官统一的contract?

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- 有哪些需要和面试官统一的contract?

Search criteria -> Search() -> List<Result> -> Select() -> Receipt

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- Search criteria

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- Search criteria

Make a reservation

2 people	▼	Oct 10, 2017	▼	7:00 PM	▼	Find a Table
----------	---	--------------	---	---------	---	--------------

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- Search criteria

Make a reservation

2 people	▼	Oct 10, 2017	▼	7:00 PM	▼	Find a Table
----------	---	--------------	---	---------	---	--------------

- 人数： 无拼桌，每张桌子大小相同，不会有超过桌子大小的人数

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- Search criteria

Make a reservation

2 people	▼	Oct 10, 2017	▼	7:00 PM	▼	Find a Table
----------	---	--------------	---	---------	---	--------------

- 人数：无拼桌，每张桌子大小相同，不会有超过桌子大小的人数
- 日期：是否允许预定多日以后的？

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- Search criteria

Make a reservation

2 people	▼	Oct 10, 2017	▼	7:00 PM	▼	Find a Table
----------	---	--------------	---	---------	---	--------------

- 人数：无拼桌，每张桌子大小相同，不会有超过桌子大小的人数
- 日期：是否允许预定多日以后的？
- 时间：是否所有时间都允许预定？

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- Search criteria

Make a reservation

2 people	▼	Oct 10, 2017	▼	7:00 PM	▼	Find a Table
----------	---	--------------	---	---------	---	--------------

- 人数：无拼桌，每张桌子大小相同，不会有超过桌子大小的人数
- 日期：是否允许预定多日以后的？ - 允许
- 时间：是否所有时间都允许预定？ - 24/7

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- Search criteria

Make a reservation

2 people	▼	Oct 10, 2017	▼	7:00 PM	▼	Find a Table
----------	---	--------------	---	---------	---	--------------

- 人数: 无拼桌, 每张桌子大小相同, 不会有超过桌子大小的人数
- 日期: 是否允许预定多日以后的? - 允许
- 时间: 是否所有时间都允许预定? - 24/7
- Design: FindTableForReservation(Timeslot t)

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- Search criteria

Make a reservation

2 people	▼	Oct 10, 2017	▼	7:00 PM	▼	Find a Table
----------	---	--------------	---	---------	---	--------------

- 人数：无拼桌，每张桌子大小相同，不会有超过桌子大小的人数
- 日期：是否允许预定多日以后的？ - 允许
- 时间：是否所有时间都允许预定？ - 24/7
- Design: FindTableForReservation(Timeslot t)
- Timeslot contains Date and time

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- List<Result>

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- List<Result>

-当选择的时间段可以/不行时，系统应该给出什么反馈？

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# Reservation



- 做法一:

Make a reservation

2 people	Nov 2, 2017	7:30 PM	Find a Table
----------	-------------	---------	--------------

📈 Booked 22 times today

5:30 PM	6:00 PM	7:30 PM	8:00 PM	8:30 PM
---------	---------	---------	---------	---------

[See affiliated restaurants >](#)

Make a reservation

2 people	Oct 10, 2017	7:00 PM	Find a Table
----------	--------------	---------	--------------

📈 Booked 22 times today

🕒 You're in luck! We still have 1 timeslot left

			9:30 PM	
--	--	--	---------	--

[See affiliated restaurants >](#)

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- List<Result>

Result == Timeslot

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- List<Result>


Result == Timeslot

- Design: List<Timeslot> findTableForReservation(Timeslot t)
- Possible Challenge: 跟面试官讨论如何获得这个List


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- 做法二:
  - 可以预定：直接进入Confirm阶段
  - 不能预定：Throw exception / Show message




GUESTS	DATE	TIME	RESTAURANT
2 people	Tue, Oct 10, 2017	9:30 PM	Tosceno Harvard Square


 Hurry! We can only hold this table for you for 4:34 minutes

POINTS  
Not a member? Join OpenTable and receive 100 points upon dining.

Already a member? Sign in

 Phone Number

Select an Occasion (optional) ▾

Add a special request (optional) 

☐ Yes, I want to receive email messages from this restaurant.  
☐ Yes, I want to get text updates and reminders about my reservations\*

Complete Reservation

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- 做法二:
  - 可以预定: 直接进入Confirm阶段
  - 不能预定: Throw exception / Show message
  
- Design:  $\text{Pair}\langle \text{Table}, \text{Timeslot} \rangle \text{ findTableForReservation}(\text{Time slot})$   
throws `NoTableForReservationException`

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- 做法二:
  - 可以预定: 直接进入Confirm阶段
  - 不能预定: Throw exception / Show message
- Design: `Pair<Table, Timeslot> findTableForReservation(Time slot)`  
throws `NoTableForReservationException`
- Design: `void confirmReservation(Pair<Table, Timeslot> reservation)`

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- 为什么我们可以跳过List<Result>这个步骤?

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- 为什么我们可以跳过List<Result>这个步骤?

因为Table是一样的，用户不用选择也不会知道是订1号桌还是2号桌

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- Int capacity
+ int getCapacity()

Restaurant
- List<Table> tables - List<Meal> menu - Map<Table, List<Order>> orders
+ Table findTable() + void takeOrder(Order o) + void checkout(Order o)

Table
- Boolean available - Int capacity
+ boolean isAvailable() + void markUnavailable() + void markAvailable() + get capacity()

Order
- List<Meal> meals - Table t - Party p
+ float getPrice()

Meal
- Float price
+ float getPrice()

NoTableException
------------------

扫一扫 不怀孕



ases

- Int capacity
+ int getCapacity()

Restaurant
- List<Table> tables - List<Meal> menu - Map<Table, List<Order>> orders
+ Table findTable() + void takeOrder(Order o) + void checkout(Order o)

Table
- Boolean available - Int capacity
+ boolean isAvailable() + void markUnavailable() + void markAvailable() + get capacity()

Order
- List<Meal> meals - Table t - Party p
+ float getPrice()

Meal
- Float price
+ float getPrice()

Reservation
- Table table - Timeslot timeslot

NoTableException
------------------

扫一扫 不怀孕



ases

Party
+ int getCapacity()

Restaurant
- List<Table> tables - List<Meal> menu - Map<Table, List<Order>> orders
+ Table findTable() + void takeOrder(Order o) + void checkout(Order o) + Reservation findTableForReservation(Timeslot t)

Table
- Boolean available - Int capacity
+ boolean isAvailable() + void markUnavailable() + void markAvailable() + get capacity()

Reservation
- Table table - Timeslot timeslot

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- List<Meal> meals - Table t - Party p
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NoTableException
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扫一扫 不怀孕



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Reservation
- Table table - Timeslot timeslot

Order
- List<Meal> meals - Table t - Party p
+ float getPrice()

Meal
- Float price
+ float getPrice()

NoTableException
------------------

NoTableForReservationException
--------------------------------

扫一扫 不怀孕



ases



Party
+ int getCapacity()

Restaurant
- List<Table> tables - List<Meal> menu - Map<Table, List<Order>> orders
+ Table findTable() + void takeOrder(Order o) + void checkout(Order o) + Reservation findTableForReservation(Timeslot t) + void confirmReservation(Reservation r)

Table
- Boolean available - Int capacity
+ boolean isAvailable() + void markUnavailable() + void markAvailable() + get capacity()

Reservation
- Table table - Timeslot timeslot

Order
- List<Meal> meals - Table t - Party p
+ float getPrice()

Meal
- Float price
+ float getPrice()

NoTableException
------------------

NoTableForReservationException
--------------------------------

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ases

# Any problems?

---



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# Any problems?

---

- How to know if a table is open for reservation for a timeslot?

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# Any problems?

- How to know if a table is open for reservation for a timeslot?

要知道每张桌子的预定情况

Table
<ul style="list-style-type: none"><li>- Boolean available</li><li>- Int capacity</li><li>- List&lt;Timeslot&gt; reservations</li></ul>
<ul style="list-style-type: none"><li>+ boolean isAvailable()</li><li>+ void markUnavailable()</li><li>+ void markAvailable()</li><li>+ get capacity()</li></ul>

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# Any problems?

- How to know if a table is open for reservation for a timeslot?

把时间点转换为时间段

Table
<ul style="list-style-type: none"><li>- Boolean available</li><li>- Int capacity</li><li>- List&lt;TimePeriod&gt; reservations</li></ul>
<ul style="list-style-type: none"><li>+ boolean isAvailable()</li><li>+ void markUnavailable()</li><li>+ void markAvailable()</li><li>+ get capacity()</li></ul>

扫一扫 不怀孕



Party
+ int getCapacity()

Restaurant
- List<Table> tables - List<Meal> menu - Map<Table, List<Order>> orders
+ Table findTable() + void takeOrder(Order o) + void checkout(Order o) + Reservation findTableForReservation(Timeslot t) + void confirmReservation(Reservation r)

Table
- Boolean available - Int capacity
+ boolean isAvailable() + void markUnavailable() + void markAvailable() + get capacity()

Reservation
- Table table - Timeslot timeslot

Order
- List<Meal> meals - Table t - Party p
+ float getPrice()

Meal
- Float price
+ float getPrice()

NoTableException
------------------

NoTableForReservationException
--------------------------------

扫一扫 不怀孕



ases

Party
+ int getCapacity()

TimePeroid
- Time start
- Time end

Restaurant
- List<Table> tables
- List<Meal> menu
- Map<Table, List<Order>> orders
+ Table findTable()
+ void takeOrder(Order o)
+ void checkout(Order o)
+ Reservation findTableForReservation(Timeslot t)
+ void confirmReservation(Reservation r)

Table
- Boolean available
- Int capacity
+ boolean isAvailable()
+ void markUnavailable()
+ void markAvailable()
+ get capacity()

Reservation
- Table table
- Timeslot timeslot

Order
- List<Meal> meals
- Table t
- Party p
+ float getPrice()

Meal
- Float price
+ float getPrice()

NoTableException
------------------

NoTableForReservationException
--------------------------------

扫一扫 不怀孕



ases

Party
+ int getCapacity()

TimePeroid
- Time start
- Time end

Restaurant
- List<Table> tables
- List<Meal> menu
- Map<Table, List<Order>> orders
+ Table findTable()
+ void takeOrder(Order o)
+ void checkout(Order o)
+ Reservation findTableForReservation(Timeslot t)
+ void confirmReservation(Reservation r)

Table
- Boolean available
- Int capacity
+ boolean isAvailable()
+ void markUnavailable()
+ void markAvailable()
+ get capacity()

Reservation
- Table table
- TimePeroid timePeriod

Order
- List<Meal> meals
- Table t
- Party p
+ float getPrice()

Meal
- Float price
+ float getPrice()

NoTableException
------------------

NoTableForReservationException
--------------------------------

扫一扫 不怀孕



ases



Party
+ int getCapacity()

TimePeroid
- Time start
- Time end

Restaurant
- List<Table> tables
- List<Meal> menu
- Map<Table, List<Order>> orders
+ Table findTable()
+ void takeOrder(Order o)
+ void checkout(Order o)
+ Reservation findTableForReservation(Timeslot t)
+ void confirmReservation(Reservation r)

Table
- Boolean available
- Int capacity
- List<TimePeroid> reservations
+ boolean isAvailable()
+ void markUnavailable()
+ void markAvailable()
+ get capacity()

Reservation
- Table table
- TimePeroid timePeriod

Order
- List<Meal> meals
- Table t
- Party p
+ float getPrice()

Meal
- Float price
+ float getPrice()

NoTableException
------------------

NoTableForReservationException
--------------------------------

扫一扫 不怀孕



ases

Party
+ int getCapacity()

TimePeroid
- Time start
- Time end

Table
- Boolean available
- Int capacity
+ boolean isAvailable()
+ void markUnavailable()
+ void markAvailable()
+ get capacity()

Order
- List<Meal> meals
- Table t
- Party p
+ float getPrice()

Meal
- Float price
+ float getPrice()

Restaurant
- List<Table> tables
- List<Meal> menu
- Map<Table, List<Order>> orders
- Map<Table, List<TimePeroid>> reservation
+ Table findTable()
+ void takeOrder(Order o)
+ void checkout(Order o)
+ Reservation findTableForReservation(Timeslot t)
+ void confirmReservation(Reservation r)

Reservation
- Table table
- TimePeroid timePeroid

NoTableException
------------------

NoTableForReservationException
--------------------------------

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ases

# Cancel reservation

- Restaurant takes a cancel reservation request, and ask the table to free that timeslot.

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Party
+ int getCapacity()

TimePeroid
- Time start
- Time end

Table
- Boolean available
- Int capacity
+ boolean isAvailable()
+ void markUnavailable()
+ void markAvailable()
+ get capacity()

Order
- List<Meal> meals
- Table t
- Party p
+ float getPrice()

Meal
- Float price
+ float getPrice()

Restaurant
- List<Table> tables
- List<Meal> menu
- Map<Table, List<Order>> orders
- Map<Table, List<TimePeroid>> reservation
+ Table findTable()
+ void takeOrder(Order o)
+ void checkout(Order o)
+ Reservation findTableForReservation(Timeslot t)
+ void confirmReservation(Reservation r)
+ void cancelReservation(Reservation r)

Reservation
- Table table
- TimePeroid timePeroid

NoTableException
------------------

NoTableForReservationExceptio n
---------------------------------

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ases

# Hotel reservation system

---



- Can you design a hotel reservation system?

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# Hotel reservation system



- Can you design a hotel reservation system?

### Search

Destination/Property Name:

Are you traveling for work? ?

☐ Yes ☐ No

Check-in

Check-out

1-night stay

Rooms

Adults

Children

**Search**

**Welcome to New York City, the Big Apple**  
433 properties found – including 112 value deals!

3 Reasons to Visit:

- Central Park
- Metropolitan Museum Art
- Sightseeing
- Fine Art Museums

Our Top Picks

Lowest Price First

Value for Money

**Recommended for You:**

**MODERN** Sleek design, contemporary comfort.

**NoMo SoHo**

SoHo, New York City, NY – Show on map

Subway Access

45 people are looking right now

Booked 41 times in the last 24 hours

**Great Value Today**

Double Room

**In high demand!**

Risk Free: You can cancel later, so lock in

VS.



漫趣乐园-如家上海浦东机场店

★★★★★ 5.0 分 28 点评



上海市浦东新区川沙路4518号

入住10月10日 / 离店 10月11日

小魔仙大床房A

会员价 >

超级飞侠大床房A

会员价 >

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- What

是为一间酒店设计预定房间系统，还是先选择酒店的系统？

Design上会有哪些区别？



- What

是为一间酒店设计预定房间系统，还是先选择酒店的系统？

- 搜索条件区别

人数 + 时间 VS. 人数 + 时间 + 地址

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- What

是为一间酒店设计预定房间系统，还是先选择酒店的系统？

- 返回结果区别

Rooms VS. Hotels

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- What

是为一间酒店设计预定房间系统，还是先选择酒店的系统？

- 针对本题：

先设计一间酒店，再设计选择酒店的系统

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- What

Search criteria -> Search() -> List<Result> -> Select() -> Receipt

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- What

Search criteria -> Search() -> List<Result> -> Select() -> Receipt

除了考虑题目中的名词之外，还需要从上述的三处考虑，What类型的提问主要针对List<Result>

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- What

关键字: Room

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## • What

关键字: Room

Room Type	Sleeps	Today's Price	Your Choices	Select Rooms	Confirm Your Reservation
<p>Classic Room with King Bed in high demand!</p> <p>1 king bed</p> <p>This room includes 1 extra large double bed, cable TV and a work area.</p> <p>Private bathroom</p> <p>Free WiFi</p> <p>Iron • Free toiletries</p> <p>Bathroom</p> <p>Telephone • Towels</p> <p>Linens</p>	2	<p><b>\$259</b></p> <p>Excludes: Taxes and US\$ 21.78 Property service charge per night</p> <p>There's an even lower price available!</p> <p>Sign in to see it</p>	<p>Low rate -- no money back</p> <p>Service charge</p>	0	<p>I'll reserve</p> <p>Confirmation is immediate</p> <p>101 other people looking now</p>
	2	<p><b>\$344</b></p> <p>Excludes: Taxes and US\$ 21.78 Property service charge per night</p> <p>There's an even lower price available!</p> <p>Sign in to see it</p>	<p>FREE cancellation before Oct 19, 2017</p> <p>No advance payment</p> <p>Service charge</p>	0	
	2	<p><b>\$354</b></p> <p>Excludes: Taxes and US\$ 21.78 Property service charge per night</p> <p>There's an even lower price available!</p> <p>Sign in to see it</p>	<p>Breakfast included</p> <p>FREE cancellation before Oct 19, 2017</p> <p>No advance payment</p> <p>Service charge</p>	0	
<p>Penn 5000 Room with Double Bed</p> <p>Only 1 room left!</p> <p>1 full bed</p> <p>This room includes a refrigerator and a flat-screen TV.</p> <p>Private bathroom</p> <p>Free WiFi</p> <p>More</p>	2	<p><b>\$269</b></p> <p>Excludes: Taxes and US\$ 21.78 Property service charge per night</p> <p>There's an even lower price available!</p> <p>Sign in to see it</p>	<p>Low rate -- no money back</p> <p>Service charge</p>	0	
	2	<p><b>\$354</b></p> <p>Excludes: Taxes and US\$ 21.78 Property service charge per night</p> <p>There's an even lower price available!</p> <p>Sign in to see it</p>	<p>FREE cancellation before Oct 19, 2017</p> <p>No advance payment</p> <p>Service charge</p>	0	
	2	<p><b>\$364</b></p> <p>Excludes: Taxes and US\$ 21.78 Property service charge per night</p> <p>There's an even lower price available!</p> <p>Sign in to see it</p>	<p>Breakfast included</p> <p>FREE cancellation before Oct 19, 2017</p> <p>No advance payment</p> <p>Service charge</p>	0	

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- What

针对本题：房间的人数和价格可能会不同

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# Challenge

针对本题：房间的人数和价格可能会不同。

如何设计房间类？

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# Challenge

如何设计房间类？

Room
<ul style="list-style-type: none"><li>- int capacity</li><li>- float price</li></ul>

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# Challenge

如何设计房间类?

Room
<ul style="list-style-type: none"><li>- int capacity</li><li>- float price</li></ul>

List<Result> -> List<Room>

Room_1
Capacity : 2 Price: 198

Room_2
Capacity : 2 Price: 198

Room_3
Capacity : 2 Price: 198

Room_4
Capacity : 2 Price: 198

Room_5
Capacity : 1 Price: 128

Room_6
Capacity : 1 Price: 128

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# Challenge



## 如何设计房间类?

### Room

- int capacity
- float price

List<Result> -> List<Room>

### Room\_1

Capacity : 2  
Price: 198

### Room\_2

Capacity : 2  
Price: 198

### Room\_3

Capacity : 2  
Price: 198

### Room\_4

Capacity : 2  
Price: 198

### Room\_5

Capacity : 1  
Price: 128

### Room\_6

Capacity : 1  
Price: 128

Room Type	Sleeps	Today's Price	Your Choices	Select Rooms	Confirm Your Reservation
<b>Classic Room with King Bed in high demand!</b> 1 king bed This room includes 1 extra large double bed, cable TV and a work area.	2	<b>\$259</b> Excludes: Taxes and USD 21.78 Property service charge per night There's an even lower price available! <a href="#">See it in one click</a>	<b>Low rate -- no money back</b> • Service charge	0 0	<b>I'll reserve</b> Continue search to see more 101 other people looking now
Private bathroom Free WiFi • Iron • Free toiletries • Bathroom • Telephone • Towels • Linens	2	<b>\$344</b> Excludes: Taxes and USD 21.78 Property service charge per night There's an even lower price available! <a href="#">See it in one click</a>	✓ <b>FREE</b> cancellation before Oct 19, 2017 ✓ No advance payment • Service charge	0 0	
	2	<b>\$354</b> Excludes: Taxes and USD 21.78 Property service charge per night There's an even lower price available! <a href="#">See it in one click</a>	✓ Breakfast included ✓ <b>FREE</b> cancellation before Oct 19, 2017 ✓ No advance payment • Service charge	0 0	
<b>Prem 5000 Room with Double Bed</b> Only 1 room left! 1 full bed This room includes a refrigerator and a flat-screen TV.	2	<b>\$269</b> Excludes: Taxes and USD 21.78 Property service charge per night There's an even lower price available! <a href="#">See it in one click</a>	<b>Low rate -- no money back</b> • Service charge	0 0	
Private bathroom Free WiFi More	2	<b>\$354</b> Excludes: Taxes and USD 21.78 Property service charge per night There's an even lower price available! <a href="#">See it in one click</a>	✓ <b>FREE</b> cancellation before Oct 19, 2017 ✓ No advance payment • Service charge	0 0	
	2	<b>\$364</b> Excludes: Taxes and USD 21.78 Property service charge per night There's an even lower price available! <a href="#">See it in one click</a>	✓ Breakfast included ✓ <b>FREE</b> cancellation before Oct 19, 2017 ✓ No advance payment • Service charge	0 0	

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- How

规则?

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- 预定类规则:

Search criteria

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- 预定类规则:

## Search criteria

### Search

Destination/Property Name:

New York City

Are you traveling for work? ?

☐ Yes ☒ No

Check-in

Friday, November 17, 20... ▼

Check-out

Saturday, November 18, ... ▼

1-night stay

Rooms 1 room ▼

Adults 2 adults ▼

Children No children ▼

**Search**

### Welcome to New York City, the Big Apple

433 properties found – including 112 value deals!

3 Reasons to Visit:

Central Park  
Sightseeing

Metropolitan Museum Art  
Fine Art Museums

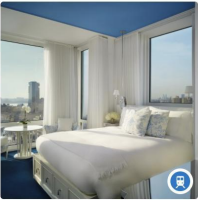
Our Top Picks

Lowest Price First

Value for Money

### Recommended for You:




**MODERN** Sleek design, contemporary comfort.




#### NoMo SoHo

SoHo, New York City, NY – Show on map  
Subway Access

45 people are looking right now  
Booked 41 times in the last 24 hours

**Great Value Today**   

Double Room   
**In high demand!**  
Risk Free: You can cancel later, so lock in

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Hotel

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Request

Hotel

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# Core object

---



Request

Hotel

RoomType

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Request

Hotel

RoomType

Room

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Request

Hotel

RoomType

Reservation

Room

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Request

Hotel

- List<Room> rooms

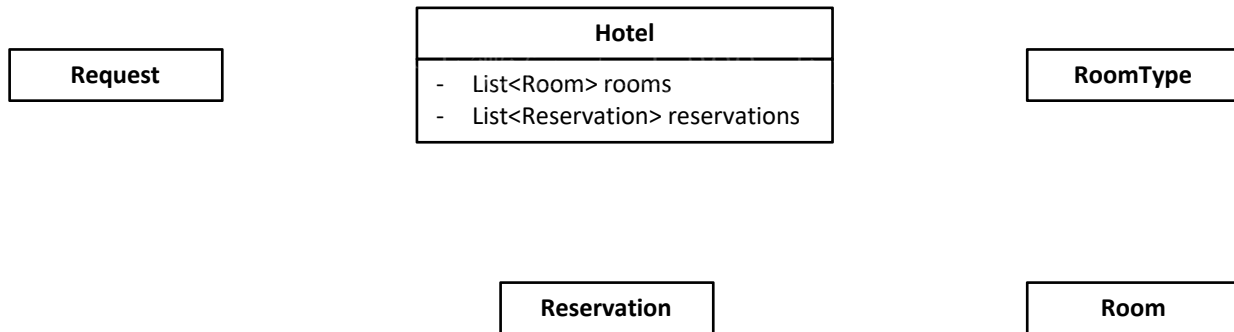
RoomType

Reservation

Room

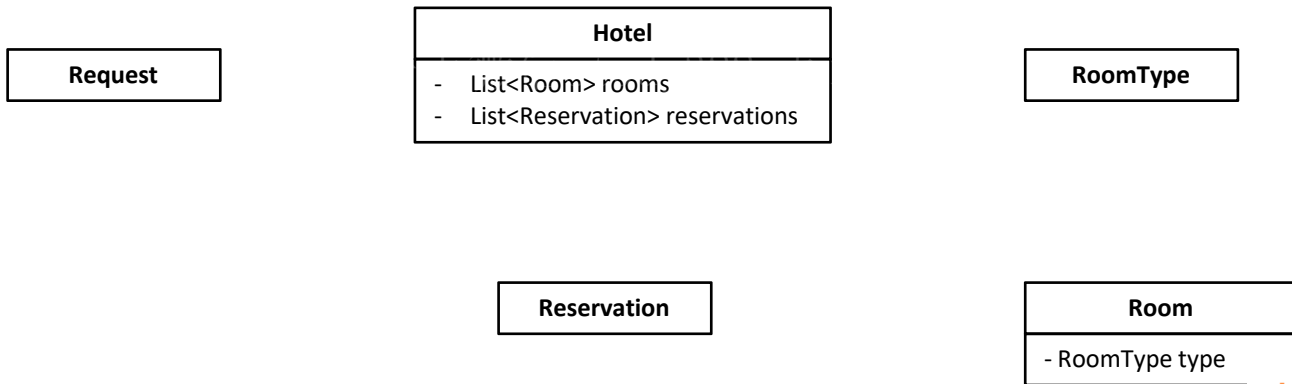
扫一扫 不怀孕





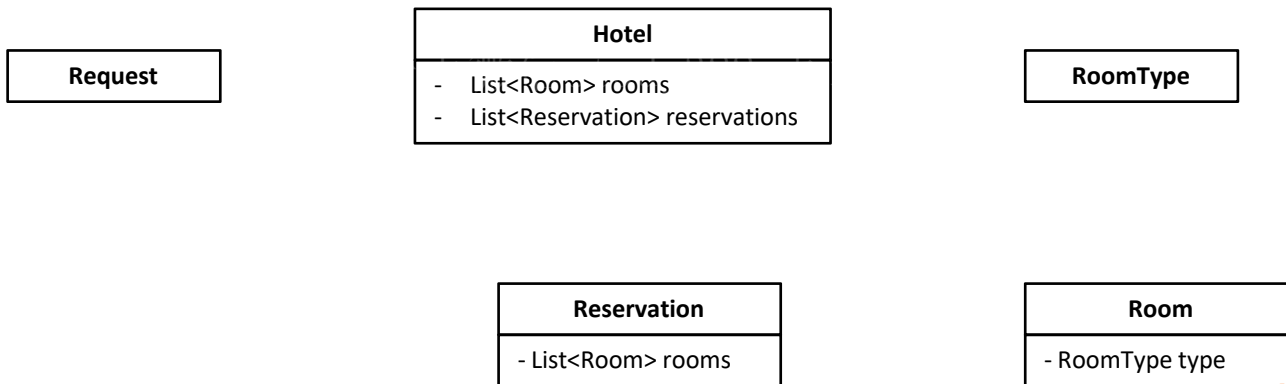
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Hotel

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# Use cases

---



Hotel:

- Search for available rooms

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# Use cases

---



Hotel:

- Search for available rooms
- Make reservation

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# Use cases

---

Hotel:

- Search for available rooms
- Make reservation
- Cancel reservation

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Request
---------

Hotel
<ul style="list-style-type: none"><li>- List&lt;Room&gt; rooms</li><li>- List&lt;Reservation&gt; reservations</li></ul>

RoomType
----------

Room
<ul style="list-style-type: none"><li>- RoomType type</li></ul>

Reservation
<ul style="list-style-type: none"><li>- List&lt;Room&gt; rooms</li></ul>

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ses
e rooms

## Search for available rooms

- 1: Based on search criteria
- 2: Go through rooms to check availability
- 3: list available room types and available count

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## Search for available rooms

1: Based on search criteria

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Request
- Date startDate

Hotel
- List<Room> rooms - List<Reservation> reservations

RoomType
----------

Room
- RoomType type

Reservation
- List<Room> rooms

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ses
e rooms



Request
<ul style="list-style-type: none"><li>- Date startDate</li><li>- Date endDate</li></ul>

Hotel
<ul style="list-style-type: none"><li>- List&lt;Room&gt; rooms</li><li>- List&lt;Reservation&gt; reservations</li></ul>

RoomType
----------

Room
<ul style="list-style-type: none"><li>- RoomType type</li></ul>

Reservation
<ul style="list-style-type: none"><li>- List&lt;Room&gt; rooms</li></ul>

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e rooms

Request
- Date startDate
- Date endDate

Hotel
- List<Room> rooms
- List<Reservation> reservations
+ Map<RoomType, int> handleSearchRequest(Request r)

RoomType
----------

Room
- RoomType type

Reservation
- List<Room> rooms

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ses
e rooms

## Search for available rooms

2: Go through rooms to check availability

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Request
<ul style="list-style-type: none"><li>- Date startDate</li><li>- Date endDate</li></ul>

Hotel
<ul style="list-style-type: none"><li>- List&lt;Room&gt; rooms</li><li>- List&lt;Reservation&gt; reservations</li></ul>
+ Map<RoomType, int> handleSearchRequest(Request r)

RoomType
----------

Room
<ul style="list-style-type: none"><li>- RoomType type</li><li>- List&lt;Date&gt; reservations</li></ul>

Reservation
- List<Room> rooms

扫一扫 不怀孕



ses
> rooms

Request
<ul style="list-style-type: none"><li>- Date startDate</li><li>- Date endDate</li></ul>

Hotel
<ul style="list-style-type: none"><li>- List&lt;Room&gt; rooms</li><li>- List&lt;Reservation&gt; reservations</li><li>- Map&lt;Room, List&lt;Date&gt;&gt; roomReservations</li></ul>
+ Map<RoomType, int> handleSearchRequest(Request r)

RoomType
----------

Room
<ul style="list-style-type: none"><li>- RoomType type</li></ul>

Reservation
<ul style="list-style-type: none"><li>- List&lt;Room&gt; rooms</li></ul>

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ses
> rooms

# Classes

Request
<ul style="list-style-type: none"><li>- Date startDate</li><li>- Date endDate</li></ul>

Hotel
<ul style="list-style-type: none"><li>- List&lt;Room&gt; rooms</li><li>- List&lt;Reservation&gt; reservations</li><li>- Map&lt;Room, List&lt;Date&gt;&gt; roomReservations</li></ul>
<ul style="list-style-type: none"><li>+ Map&lt;RoomType, int&gt; handleSearchRequest(Request r)</li><li>- boolean isRequestAvailable(Request r, List&lt;Date&gt; dates)</li></ul>

RoomType
----------

Room
<ul style="list-style-type: none"><li>- RoomType type</li></ul>

Reservation
<ul style="list-style-type: none"><li>- List&lt;Room&gt; rooms</li></ul>

扫一扫 不怀孕



ses
rooms

Request
<ul style="list-style-type: none"><li>- Date startDate</li><li>- Date endDate</li></ul>

Hotel
<ul style="list-style-type: none"><li>- List&lt;Room&gt; rooms</li><li>- List&lt;Reservation&gt; reservations</li><li>- Map&lt;Room, List&lt;Date&gt;&gt; roomReservations</li></ul>
<ul style="list-style-type: none"><li>+ Map&lt;RoomType, int&gt; handleSearchRequest(Request r)</li><li>- boolean isRequestAvailable(Request r, List&lt;Date&gt; dates)</li></ul>

RoomType
----------

Room
<ul style="list-style-type: none"><li>- RoomType type</li><li>- Boolean available</li></ul>

Reservation
<ul style="list-style-type: none"><li>- List&lt;Room&gt; rooms</li></ul>

扫一扫 不怀孕



ses
> rooms

# Classes

Request
<ul style="list-style-type: none"><li>- Date startDate</li><li>- Date endDate</li></ul>

Hotel
<ul style="list-style-type: none"><li>- List&lt;Room&gt; rooms</li><li>- List&lt;Reservation&gt; reservations</li><li>- Map&lt;Room, List&lt;Date&gt;&gt; roomReservations</li></ul>
<ul style="list-style-type: none"><li>+ Map&lt;RoomType, int&gt; handleSearchRequest(Request r)</li><li>- boolean isRequestAvailable(Request r, List&lt;Date&gt; dates)</li></ul>

RoomType
----------

Room
<ul style="list-style-type: none"><li>- RoomType type</li><li>- Boolean available</li></ul>
<ul style="list-style-type: none"><li>+ boolean isAvailable()</li></ul>

Reservation
<ul style="list-style-type: none"><li>- List&lt;Room&gt; rooms</li></ul>

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ses
rooms



## Search for available rooms

3: list available room types and counts

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# Classes



Request
<ul style="list-style-type: none"><li>- Date startDate</li><li>- Date endDate</li></ul>

Hotel
<ul style="list-style-type: none"><li>- List&lt;Room&gt; rooms</li><li>- List&lt;Reservation&gt; reservations</li><li>- Map&lt;Room, List&lt;Date&gt;&gt; roomReservations</li></ul>
<ul style="list-style-type: none"><li>+ Map&lt;RoomType, int&gt; handleSearchRequest(Request r)</li><li>- boolean isRequestAvailable(Request r, List&lt;Date&gt; dates)</li></ul>

RoomType
SINGLE DOUBLE

Room
<ul style="list-style-type: none"><li>- RoomType type</li><li>- Boolean available</li></ul>
+ boolean isAvailable()

Reservation
- List<Room> rooms

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ses
> rooms

Request
<ul style="list-style-type: none"><li>- Date startDate</li><li>- Date endDate</li></ul>

--

<<Enumeration>> RoomType
SINGLE DOUBLE

Room
<ul style="list-style-type: none"><li>- RoomType type</li><li>- Boolean available</li></ul>
+ boolean isAvailable()

Reservation
- List<Room> rooms

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ses
> rooms

## Make reservation

- 1: Add RoomType and number of rooms in a request
- 2: Send request to Hotel
- 3: If there is enough room left, confirm the reservation
- 4: If there isn't enough room left, throw exception

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## Make reservation

1: Add RoomType and number of rooms in a request

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Request
- Date startDate
- Date endDate



<<Enumeration>> RoomType
SINGLE DOUBLE

Room
- RoomType type
- Boolean available
+ boolean isAvailable()

Reservation
- List<Room> rooms

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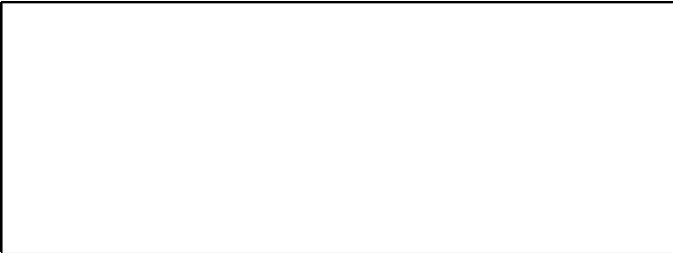


ses
rooms

Request
- Date startDate
- Date endDate

Reservation
- List<Room> rooms

ReservationRequest



<<Enumeration>> RoomType
SINGLE DOUBLE

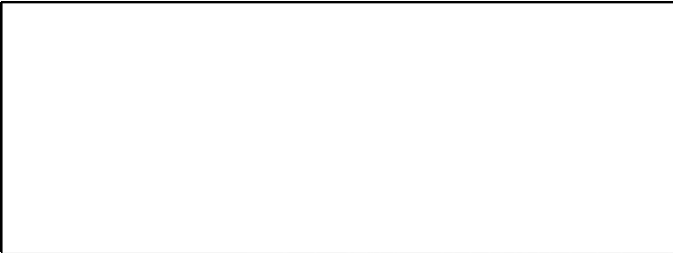
Room
- RoomType type
- Boolean available
+ boolean isAvailable()

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ses
rooms

Request
- Date startDate
- Date endDate



<<Enumeration>> RoomType
SINGLE DOUBLE

Room
- RoomType type
- Boolean available
+ boolean isAvailable()

Reservation
- List<Room> rooms

ReservationRequest
- Date startDate
- Date endDate

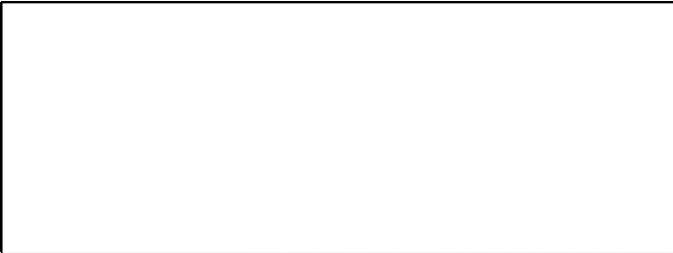
扫一扫 不怀孕



ses
rooms



Request
<ul style="list-style-type: none"><li>- Date startDate</li><li>- Date endDate</li></ul>



<<Enumeration>> RoomType
SINGLE DOUBLE

Room
<ul style="list-style-type: none"><li>- RoomType type</li><li>- Boolean available</li></ul>
+ boolean isAvailable()

Reservation
- List<Room> rooms

ReservationRequest
<ul style="list-style-type: none"><li>- Date startDate</li><li>- Date endDate</li><li>- Map&lt;RoomType, int&gt; roomsNeeded</li></ul>

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ses
rooms

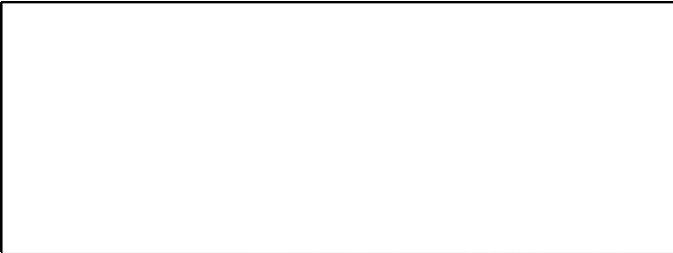
## Make reservation

2: Send request to Hotel

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Request
<ul style="list-style-type: none"><li>- Date startDate</li><li>- Date endDate</li></ul>



<<Enumeration>> RoomType
SINGLE DOUBLE

Room
<ul style="list-style-type: none"><li>- RoomType type</li><li>- Boolean available</li></ul>
+ boolean isAvailable()

Reservation
- List<Room> rooms

ReservationRequest
<ul style="list-style-type: none"><li>- Date startDate</li><li>- Date endDate</li><li>- Map&lt;RoomType, int&gt; roomsNeeded</li></ul>

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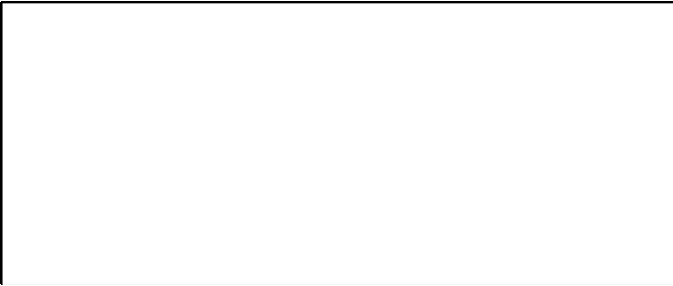


ses
rooms

Request
<ul style="list-style-type: none"><li>- Date startDate</li><li>- Date endDate</li></ul>

Reservation
<ul style="list-style-type: none"><li>- List&lt;Room&gt; rooms</li></ul>

ReservationRequest
<ul style="list-style-type: none"><li>- Date startDate</li><li>- Date endDate</li><li>- Map&lt;RoomType, int&gt; roomsNeeded</li></ul>



<<Enumeration>> RoomType
SINGLE DOUBLE

Room
<ul style="list-style-type: none"><li>- RoomType type</li><li>- Boolean available</li></ul>
+ boolean isAvailable()

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## Make reservation

3: If there is enough room left, confirm the reservation

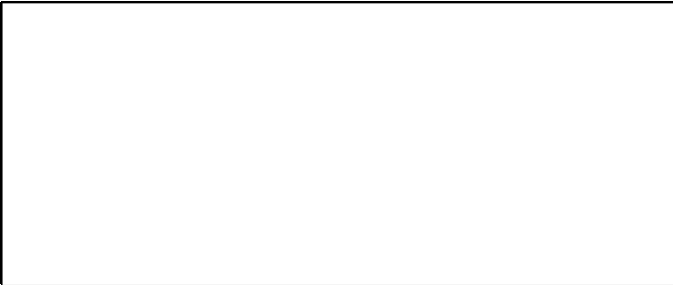
扫一扫 不怀孕



Request
<ul style="list-style-type: none"><li>- Date startDate</li><li>- Date endDate</li></ul>

Reservation
<ul style="list-style-type: none"><li>- List&lt;Room&gt; rooms</li><li>- Date startDate</li><li>- Date endDate</li></ul>

ReservationRequest
<ul style="list-style-type: none"><li>- Date startDate</li><li>- Date endDate</li><li>- Map&lt;RoomType, int&gt; roomsNeeded</li></ul>



<<Enumeration>> RoomType
SINGLE DOUBLE

Room
<ul style="list-style-type: none"><li>- RoomType type</li><li>- Boolean available</li></ul>
+ boolean isAvailable()

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rooms

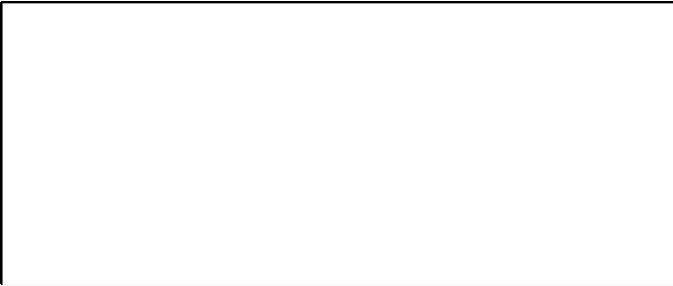
## Make reservation

4: If there isn't enough room left, throw exception

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Request
<ul style="list-style-type: none"><li>- Date startDate</li><li>- Date endDate</li></ul>



<<Enumeration>> RoomType
SINGLE DOUBLE

Room
<ul style="list-style-type: none"><li>- RoomType type</li><li>- Boolean available</li></ul>
+ boolean isAvailable()

Reservation
<ul style="list-style-type: none"><li>- List&lt;Room&gt; rooms</li><li>- Date startDate</li><li>- Date endDate</li></ul>

ReservationRequest
<ul style="list-style-type: none"><li>- Date startDate</li><li>- Date endDate</li><li>- Map&lt;RoomType, int&gt; roomsNeeded</li></ul>

NotEnoughRoomForReservationException
--------------------------------------

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ses
rooms



## Search for available rooms

- 1: Based on search criteria
- 2: Go through rooms to check availability
- 3: list available room types and room count

## Make reservation

- 1: Add RoomType and number of rooms in a request
- 2: Send request to Hotel
- 3: If there is enough room left, confirm the reservation
- 4: If there isn't enough left, throw exception

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# Challenge



九章算法

```
Map<RoomType, List<Room>> map = new HashMap<>();

for(Entry<Room, List<Date>> entry : roomReservations.entrySet())
{
    Room r = entry.getKey();
    List<Date> roomBooked = entry.getValue();

    if(isRequestAvailable(roomBooked))一手微信study322 九
    {
        if(map.containsKey(r.getRoomType()))
        {
            List<Room> roomList = map.get(r.getRoomType());
            roomList.add(r);
            map.put(r.getRoomType(), roomList);
        }
        else
        {
            List<Room> roomList = new ArrayList<>();
            roomList.add(r);
            map.put(r.getRoomType(), roomList);
        }
    }
}
```

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# Challenge

- Map<RoomType, List<Room>> map
  - Go through rooms to check availability
  - If there is enough room left, confirm the reservation
  - If there isn't enough room left, throw exception

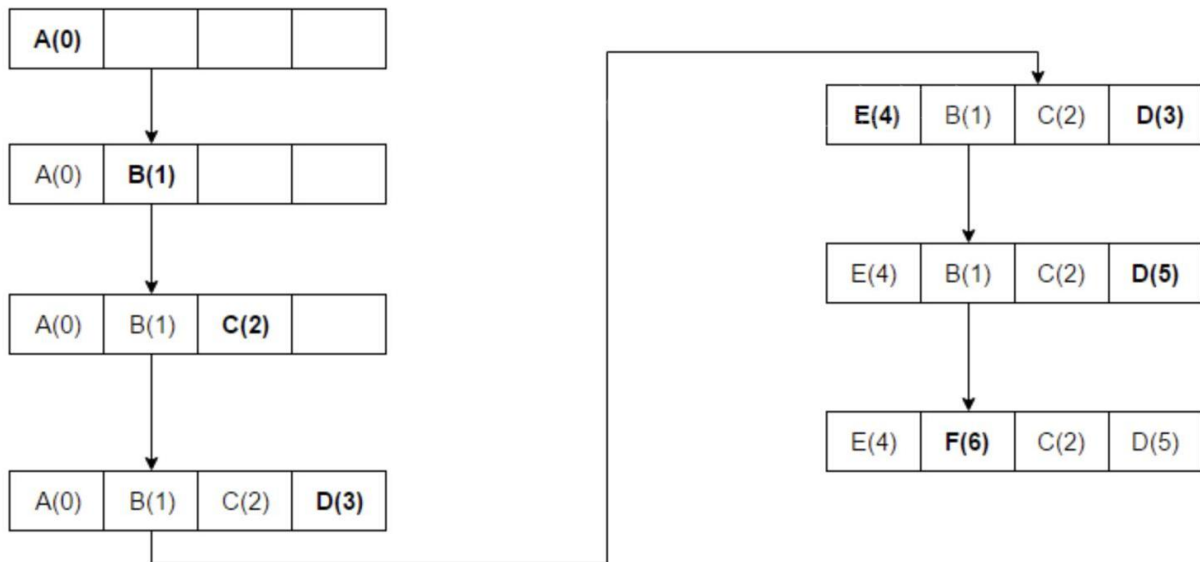
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# Challenge

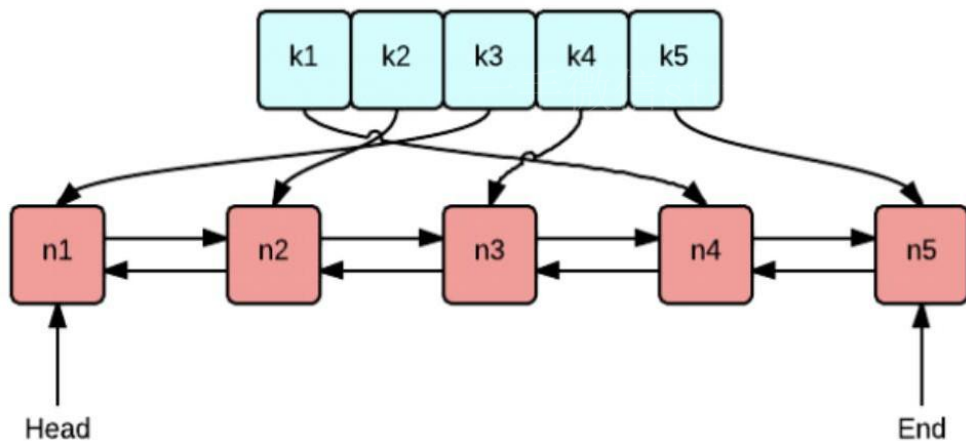
## - LRU Cache

The access sequence for the below example is A B C D E D F.



# Challenge

## - LRU Cache



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# Challenge

```
class LRUCache extends LinkedHashMap<Request, Map<RoomType, List<Room>>>
{
    private int capacity;

    public LRUCache(int capacity)
    {
        super(capacity);
        this.capacity = capacity;
    }

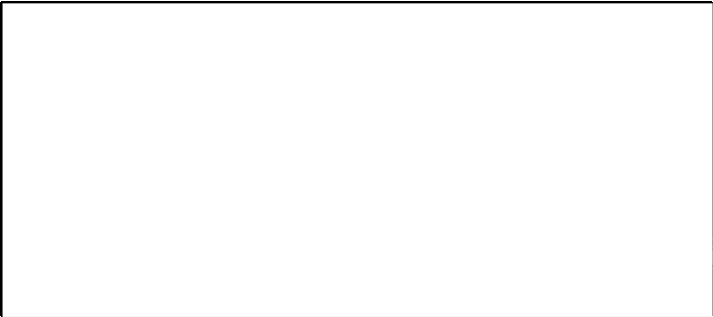
    @Override
    protected boolean removeEldestEntry(Map.Entry<Request, Map<RoomType, List<Room>>> eldest){
        return size() > this.capacity;
    }
}
```

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Request
<ul style="list-style-type: none"><li>- Date startDate</li><li>- Date endDate</li></ul>



<<Enumeration>> RoomType
SINGLE DOUBLE

Room
<ul style="list-style-type: none"><li>- RoomType type</li><li>- Boolean available</li></ul>
+ boolean isAvailable()

Reservation
<ul style="list-style-type: none"><li>- List&lt;Room&gt; rooms</li><li>- Date startDate</li><li>- Date endDate</li></ul>

ReservationRequest
<ul style="list-style-type: none"><li>- Date startDate</li><li>- Date endDate</li><li>- Map&lt;RoomType, int&gt; roomsNeeded</li></ul>

NotEnoughRoomForReservationException
--------------------------------------

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rooms

## Cancel reservation

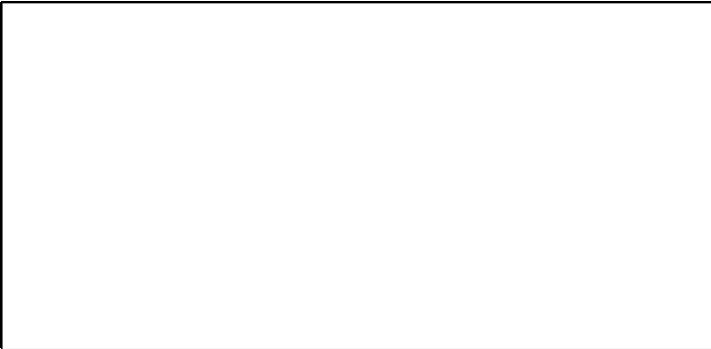
1: Hotel system takes a reservation, and cancel it.

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Request
<ul style="list-style-type: none"><li>- Date startDate</li><li>- Date endDate</li></ul>



<<Enumeration>> RoomType
SINGLE DOUBLE

Room
<ul style="list-style-type: none"><li>- RoomType type</li><li>- Boolean available</li></ul>
+ boolean isAvailable()

Reservation
<ul style="list-style-type: none"><li>- List&lt;Room&gt; rooms</li><li>- Date startDate</li><li>- Date endDate</li></ul>

ReservationRequest
<ul style="list-style-type: none"><li>- Date startDate</li><li>- Date endDate</li><li>- Map&lt;RoomType, int&gt; roomsNeeded</li></ul>

NotEnoughRoomForReservationException
--------------------------------------

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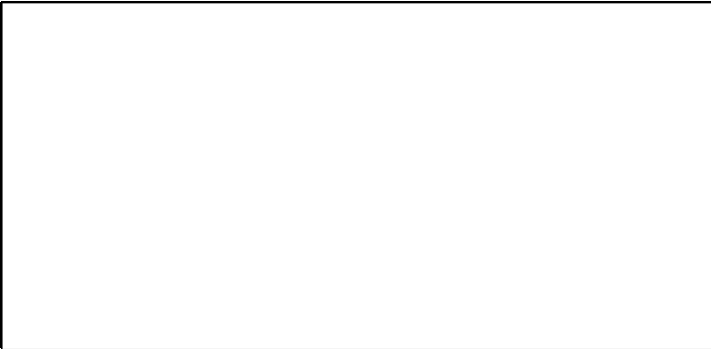


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rooms

# Classes – Final view



Request
<ul style="list-style-type: none"><li>- Date startDate</li><li>- Date endDate</li></ul>



<<Enumeration>> RoomType
SINGLE DOUBLE

Room
<ul style="list-style-type: none"><li>- RoomType type</li><li>- Boolean available</li></ul>
+ boolean isAvailable()

Reservation
<ul style="list-style-type: none"><li>- List&lt;Room&gt; rooms</li><li>- Date startDate</li><li>- Date endDate</li></ul>

ReservationRequest
<ul style="list-style-type: none"><li>- Date startDate</li><li>- Date endDate</li><li>- Map&lt;RoomType, int&gt; roomsNeeded</li></ul>

NotEnoughRoomForReservationException
--------------------------------------

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ses
rooms

九章算法 e5d850

## Hotel Reservation in Action

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```
5 // Search for available rooms
6 // Steps:
7 // - Gather search criteria
8 // - Go through rooms to get available rooms
9 // - Return in:
10 //     Single Room : 20
11 //     Double Room : 10
12 Map<RoomType, Integer> handleSearchRequest(Request request)
13 {
14     Map<RoomType, Integer> searchResult = new HashMap<>();
15     for (Room room : rooms)
16     {
17         List<Date> schedule = roomReservations.get(room);
18         if (isRequestAvailable(request, schedule))
19         {
20             RoomType roomType = room.getType();
21             if (searchResult.containsKey(roomType))
22             {
23                 int availableCount = searchResult.get(roomType);
24                 searchResult.put(roomType, availableCount + 1);
25             }
26             else
27             {
28                 searchResult.put(roomType, 1);
29             }
30         }
31     }
32     return searchResult;
33 }
```

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```
35 // Make reservation
36 // Steps:
37 // - Gather reservation criteria
38 // - Go through rooms to get available rooms
39 // - If there are available rooms, confirm reservation and update rooms
40 // - If not, throw exception
41 Reservation makeReservation(ReservationRequest request) throws NotEnoughRoomException
42 {
43     HashMap<RoomType, Integer> roomsNeeded = request.getRoomsNeeded();
44     Reservation reservation = new Reservation(request);
45     for (Room room : rooms)
46     {
47         RoomType type = room.getType();
48         int count = roomsNeeded.get(type);
49         if(roomsNeeded.containsKey(type) && count > 0)
50         {
51             List<Date> schedule = roomReservations.get(room);
52             if (isRequestAvailable(request, room))
53             {
54                 reservation.addRoom(room);
55                 count --;
56                 roomsNeeded.put(type, count);
57             }
58         }
59     }
60     for (Map.Entry<RoomType, Integer> entry : roomsNeeded.entrySet())
61     {
62         if (entry.getValue() > 0)
63         {
64             throw new NotEnoughRoomException("For type: " + entry.getKey() +
65                 ", need " + entry.getValue() + " more rooms.");
66         }
67     }
68     return reservation;
69 }
```

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```
72 // Cancel reservation
73 // Steps:
74 // - Make sure the reservation is valid
75 // - Cancel it, and update rooms
76 void cancelReservation(Reservation reservation) throws InvalidReservationException
77 {
78     if (!validReservation(reservation))
79     {
80         throw new InvalidReservationException("some reason why it's invalid.");
81     }
82
83     for(Room room : reservation.getRooms())
84     {
85         List<Date> schedule = roomReservations.get(room);
86         for(Date date = request.getStartDate(); date < request.getEndDate(); date++)
87         {
88             schedule.remove(date);
89         }
90         roomReservations.put(room, schedule);
91     }
92 }
```

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```
5 // Search for available rooms
6 // Steps:
7 // - Gather search criteria
8 // - Go through rooms to get available rooms
9 // - Return in:
10 //     Single Room : 20
11 //     Double Room : 10    一手微信study322 九章都有
12 Map<RoomType, Integer> handleSearchRequest(Request request)
13 {
14     Map<RoomType, Set<Room>> cachedResult = cache.get(request);
15     Map<RoomType, Integer> result = new HashMap<>();
16     for (Map.Entry<RoomType, Set<Room>> entry : cachedResult.entrySet())
17     {
18         result.put(entry.getKey(), entry.getValue().size());
19     }
20     return result;
21 }
22
```

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```
44 Reservation makeReservation(ReservationRequest request) throws NotEnoughRoomException
45 {
46     Map<RoomType, Integer> roomsNeeded = request.getRoomsNeeded();
47     Reservation reservation;
48
49     if(cache.containsKey(request))
50     {
51         Map<RoomType, Set<Room>> cachedResult = cache.get(request);
52         reservation = new Reservation(request);
53         for (Map.Entry<RoomType, Integer> entry : roomsNeeded.entrySet())
54         {
55             RoomType type = entry.getKey();
56             Integer count = entry.getValue();
57             if (cachedResult.get(type).size() < count)
58             {
59                 throw new NotEnoughRoomException("Not enough rooms");
60             }
61             else
62             {
63                 while(count > 0)
64                 {
65                     Room room = cachedResult.get(type).remove();
66                     updateSchedule(request, room);
67                     reservation.addRoom(room);
68                     count --;
69                 }
70             }
71         }
72         cache.update(reservation);
73     }
74     else
75     {
76         // find result and update cache...
77     }
78     return reservation;
79 }
```

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# Challenge

面试官：

Can you extend your design to a booking.com like system?

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# Challenge

Search criteria -> Search() -> List<Result> -> Select() -> Receipt

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# Challenge

Search criteria -> Search() -> List<Result> -> Select() -> Receipt

Search criteria A -> Search() -> List<Result\_A> -> Select() -> Search  
criteria B -> Search() -> List<Result\_B> -> Select() -> Receipt

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# Challenge

Search criteria -> Search() -> List<Result> -> Select() -> Receipt

Search criteria A -> Search() -> List<Result\_A> -> Select() -> Search  
criteria B -> Search() -> List<Result\_B> -> Select() -> Receipt

Search criteria A : 10/30 -11/5 Boston

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# Challenge

Search criteria -> Search() -> List<Result> -> Select() -> Receipt

Search criteria A -> Search() -> List<Result\_A> -> Select() -> Search  
criteria B -> Search() -> List<Result\_B> -> Select() -> Receipt

Search criteria A : 10/30 -11/5 Boston

BookingSystem.Search()

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# Challenge

Search criteria -> Search() -> List<Result> -> Select() -> Receipt

Search criteria A -> Search() -> List<Result\_A> -> Select() -> Search  
criteria B -> Search() -> List<Result\_B> -> Select() -> Receipt

Search criteria A : 10/30 -11/5 Boston

BookingSystem.Search()

List<Result\_A>: Hotel\_1, Hotel\_2,...

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# Challenge

Search criteria -> Search() -> List<Result> -> Select() -> Receipt

Search criteria A -> Search() -> List<Result\_A> -> Select() -> Search  
criteria B -> Search() -> List<Result\_B> -> Select() -> Receipt

Search criteria A : 10/30 -11/5 Boston BookingSystem.Search() List<Result\_A>:

Hotel\_1, Hotel\_2,...

BookingSystem.Select()

扫一扫 不怀孕



# Challenge

Search criteria -> Search() -> List<Result> -> Select() -> Receipt

Search criteria A -> Search() -> List<Result\_A> -> Select() -> Search  
criteria B -> Search() -> List<Result\_B> -> Select() -> Receipt

Search criteria A : 10/30 -11/5 Boston

Search criteria B : 10/30 -11/5

BookingSystem.Search()

List<Result\_A>: Hotel\_1, Hotel\_2,...

BookingSystem.Select()

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# Challenge

Search criteria -> Search() -> List<Result> -> Select() -> Receipt

Search criteria A -> Search() -> List<Result\_A> -> Select() -> Search  
criteria B -> Search() -> List<Result\_B> -> Select() -> Receipt

Search criteria A : 10/30 -11/5 Boston

Search criteria B : 10/30 -11/5

BookingSystem.Search()

Hotel\_1.Search()

List<Result\_A>: Hotel\_1, Hotel\_2,...

BookingSystem.Select()

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# Challenge

Search criteria -> Search() -> List<Result> -> Select() -> Receipt

Search criteria A -> Search() -> List<Result\_A> -> Select() -> Search  
criteria B -> Search() -> List<Result\_B> -> Select() -> Receipt

Search criteria A : 10/30 -11/5 Boston

Search criteria B : 10/30 -11/5

BookingSystem.Search()

Hotel\_1.Search()

List<Result\_A>: Hotel\_1, Hotel\_2,...

List<Result\_A>: RoomType

BookingSystem.Select()

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# Challenge

Search criteria -> Search() -> List<Result> -> Select() -> Receipt

Search criteria A -> Search() -> List<Result\_A> -> Select() -> Search  
criteria B -> Search() -> List<Result\_B> -> Select() -> Receipt

Search criteria A : 10/30 -11/5 Boston

Search criteria B : 10/30 -11/5

BookingSystem.Search()

Hotel\_1.Search()

List<Result\_A>: Hotel\_1, Hotel\_2,...

List<Result\_A>: RoomType

BookingSystem.Select()

BookingSystem.Select()

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What

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What

Search criteria A

List<Result\_A>

Search criteria B

List<Result\_B>

Receipt

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What

Search criteria A

List<Result\_A>

Search criteria B


List<Result\_B>

Receipt

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## What

 **Find Deals for Any Season**  
From cozy country homes to funky city apartments

Destination, property name or address:





Check-in  Check-out

Are you traveling for work? ☐ Yes ☐ No 

Rooms  Adults   
Children

**Search**

Ashburn, VA

 Fri 10/13	 Sat 10/14
 1 room 	 2 guests 

What are the search criteria for booking system ?

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针对本题:

用Start Date, End Date, Group size, City

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How

Search()

Select()

Search()

Select()

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How

Search()

Select()

Search()

Select()

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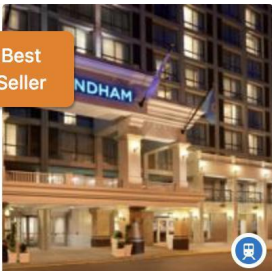


## How

Our Top Picks	Lowest Price First	Stars ▼	Distance From Downtown	Review Score
---------------	--------------------	---------	------------------------	--------------

## Recommended for You:

Best Seller






### Wyndham Boston Beacon Hill

West End, Boston, MA – [Show on map](#) (2,800 feet from center) – Subway Access

The Museum of Science and TD Bank Garden are located 900 metres from this Boston city centre hotel, featuring completely non-smoking rooms, an on-site restaurant and many modern amenities.

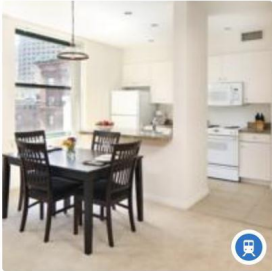
**In high demand!** Booked 64 times in the last 24 hours

Good 7.8  
1,830 reviews

Show prices

\$ \$ \$ \$ \$



### Apartments Oakwood Boston

Financial District, Boston, MA – [Show on map](#) (1,000 feet from center) – Subway Access

Located in Financial District of Boston, Oakwood Boston offers a fitness centre and free WiFi. The property is 100 metres from Faneuil Hall, 100 metres from Quincy Market and 4 km from Fenway Park.

Booked 2 times in the last 48 hours

Excellent 8.7  
73 reviews

Location 9.5

Show prices

\$ \$ \$ \$ \$

- 哪些Hotel可以被放进List里?
- 按照什么顺序排序?

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## How

针对本题：

- 在同样的City就能放进List里
- Hotel在List里的顺序不重要

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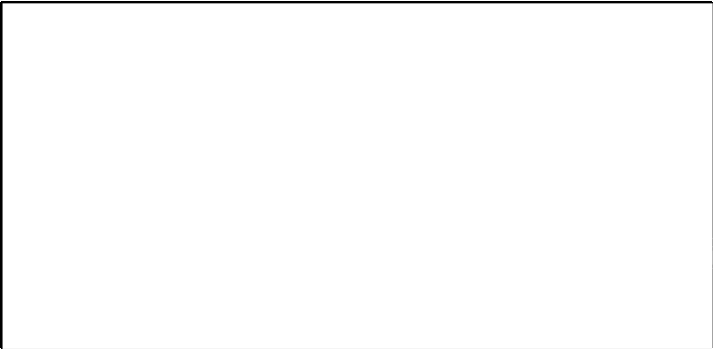
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# Core object



Request
<ul style="list-style-type: none"><li>- Date startDate</li><li>- Date endDate</li></ul>



<<Enumeration>> RoomType
SINGLE DOUBLE

Room
<ul style="list-style-type: none"><li>- RoomType type</li><li>- Boolean available</li></ul>
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Reservation
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NotEnoughRoomForReservationException
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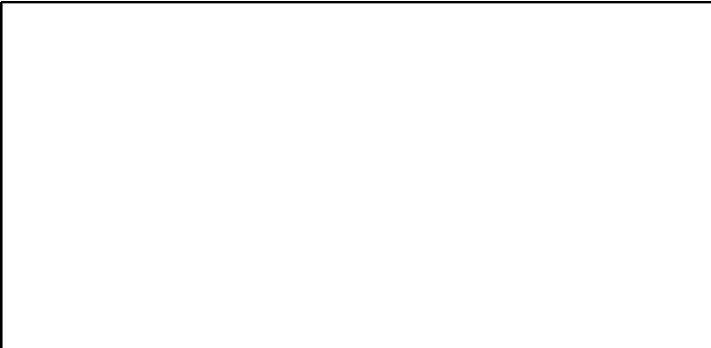


ses
rooms

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BookingSystem
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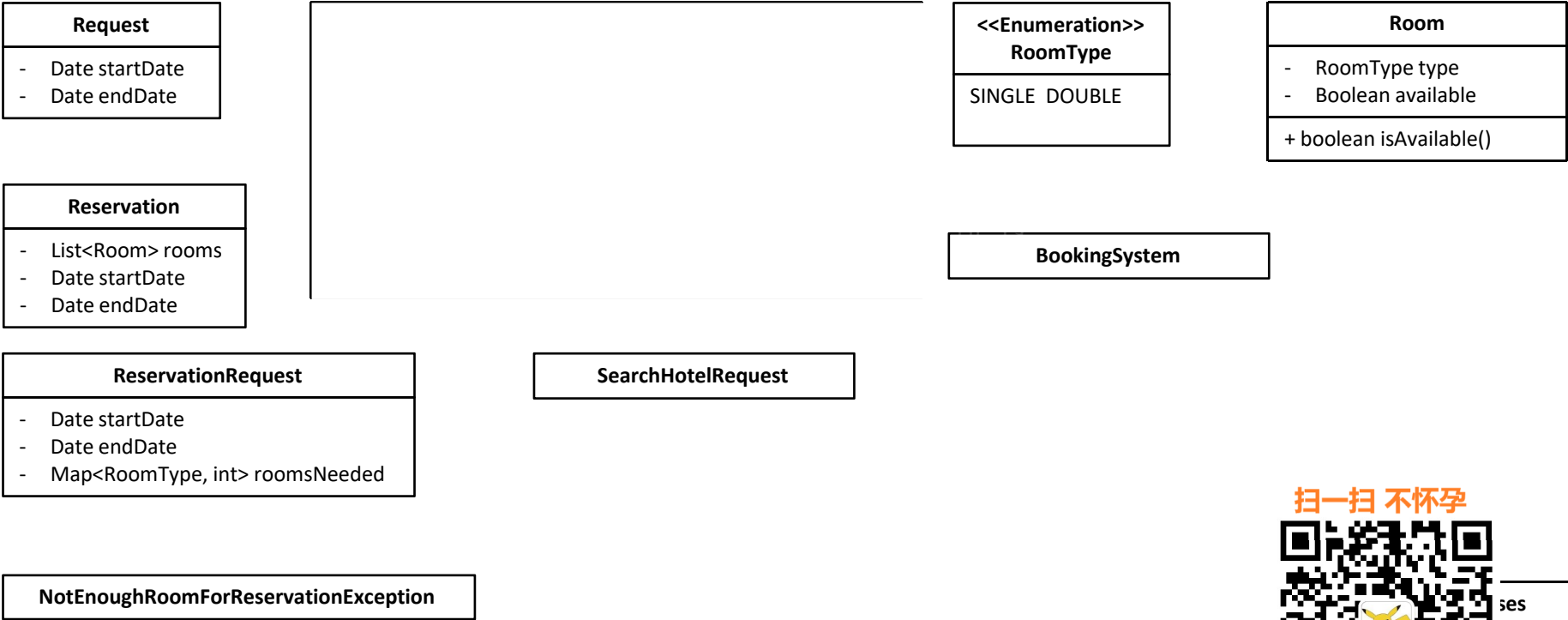
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rooms

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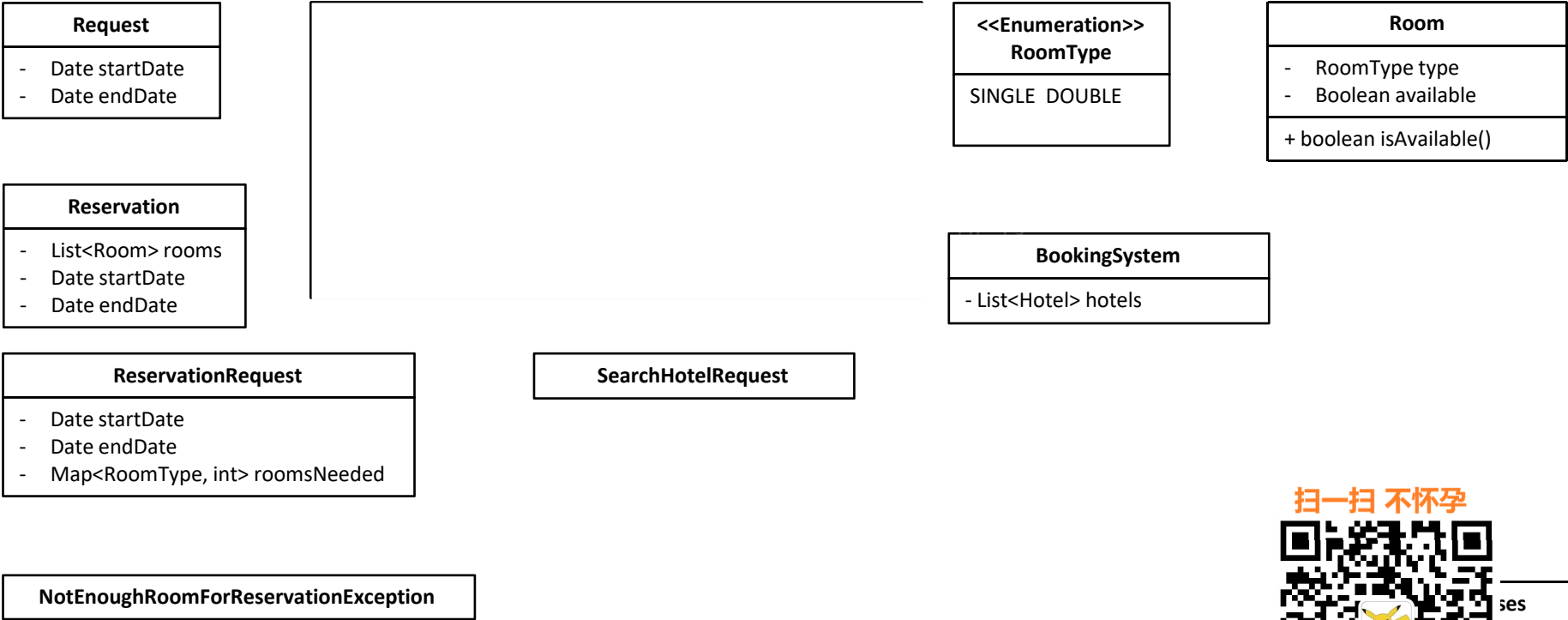
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# Core object



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- BookingSystem

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# Use cases

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- BookingSystem
- Search for hotels

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# Use cases



- BookingSystem
  - Search for hotels
  - Make reservation

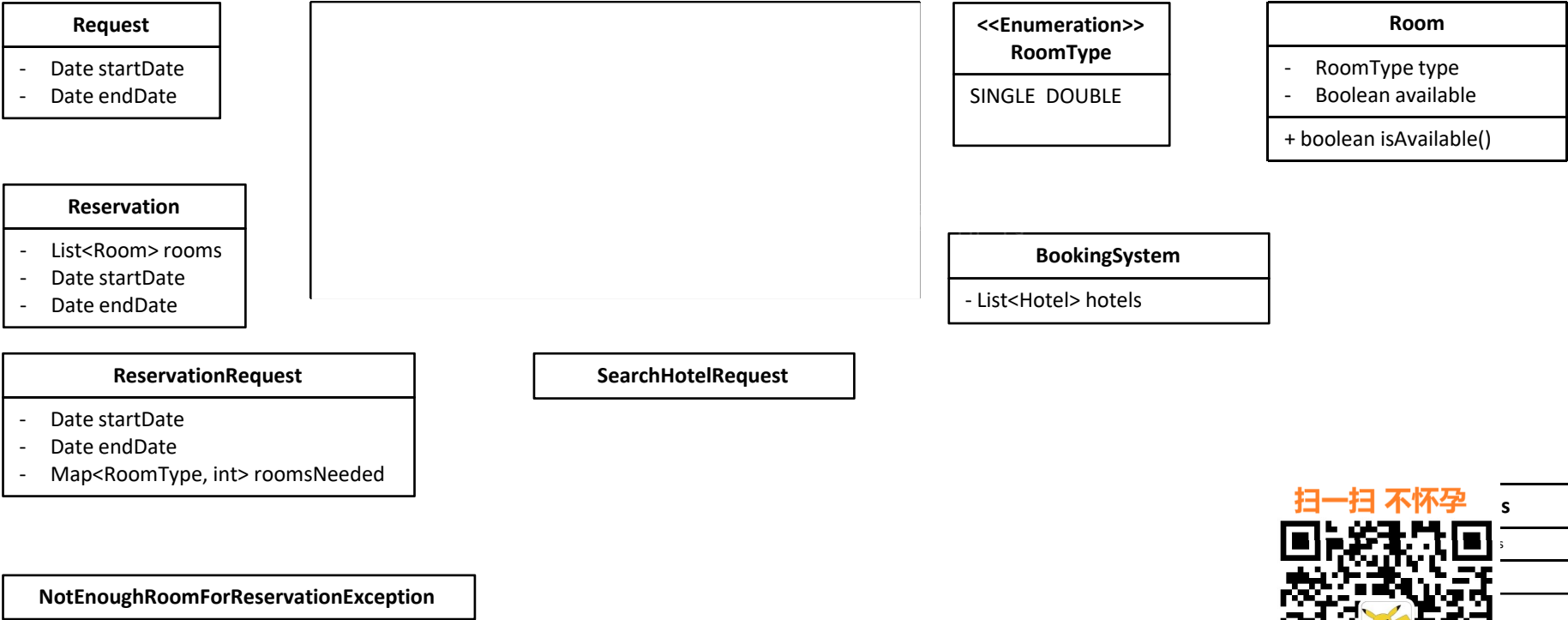
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- BookingSystem
  - Search for hotels
  - Make reservation
  - Cancel reservation

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- Search for hotels
  - Based on request (start date + end date + city + group size)
  - Check for all hotels in this city
  - For such hotels, if this is enough capacity for group size during dates
  - List all hotels that satisfy above criteria

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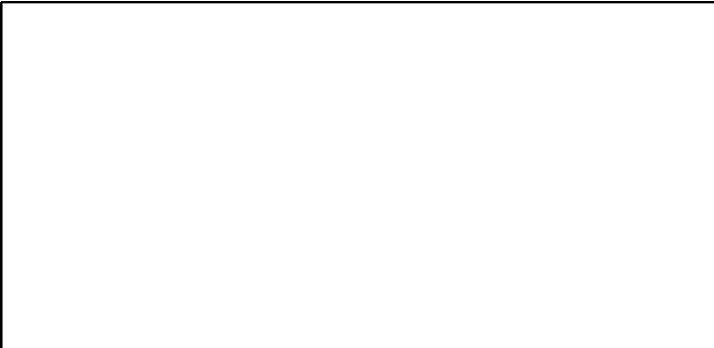


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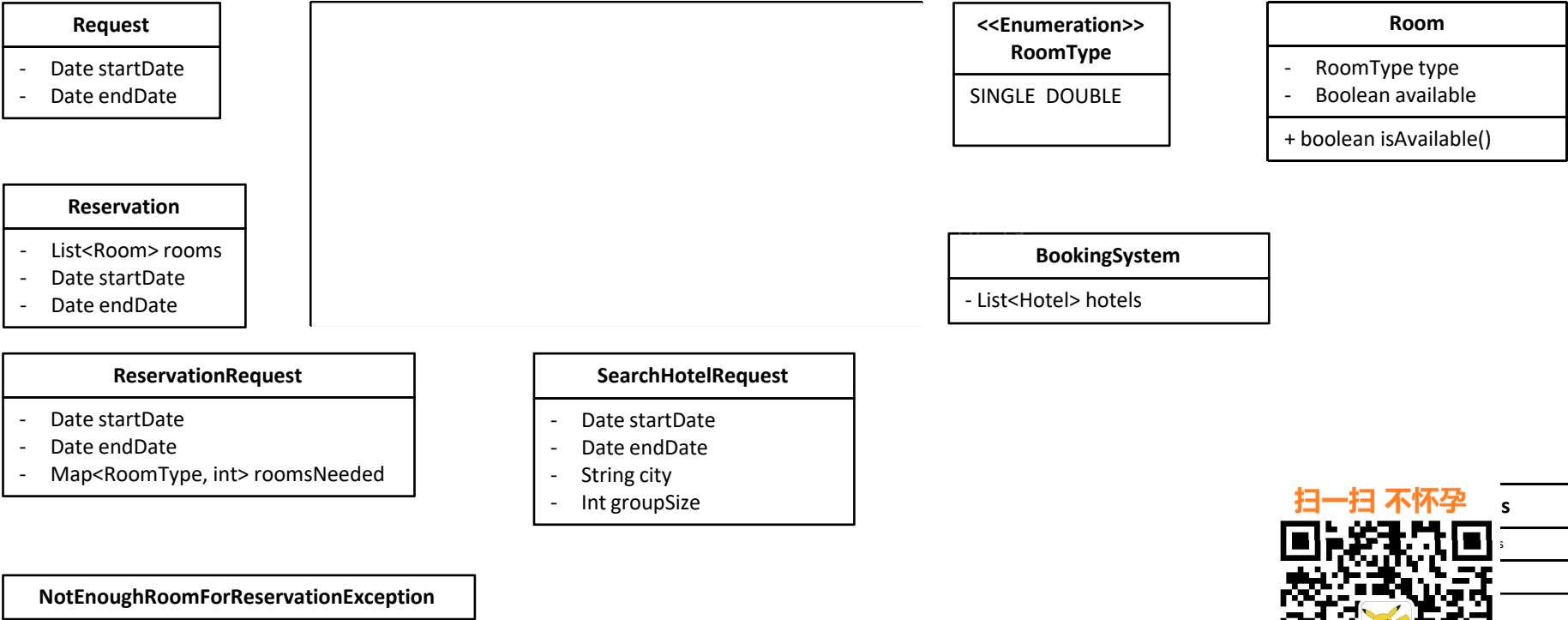


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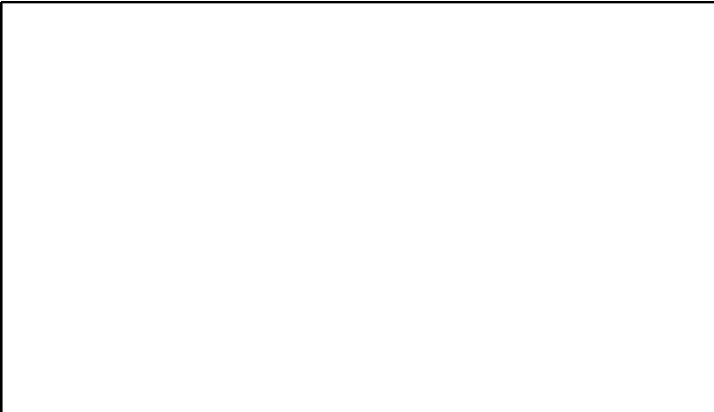


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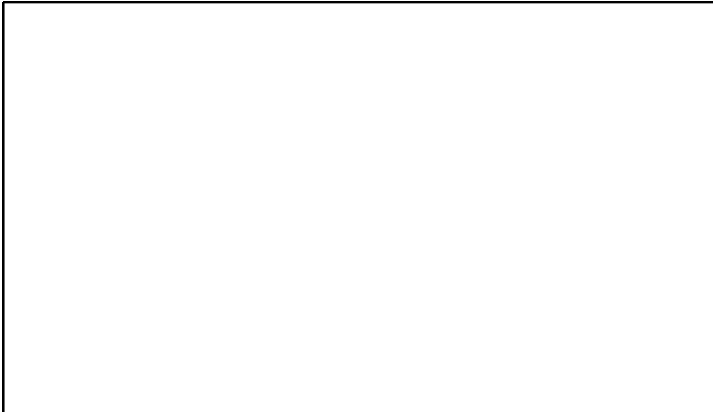
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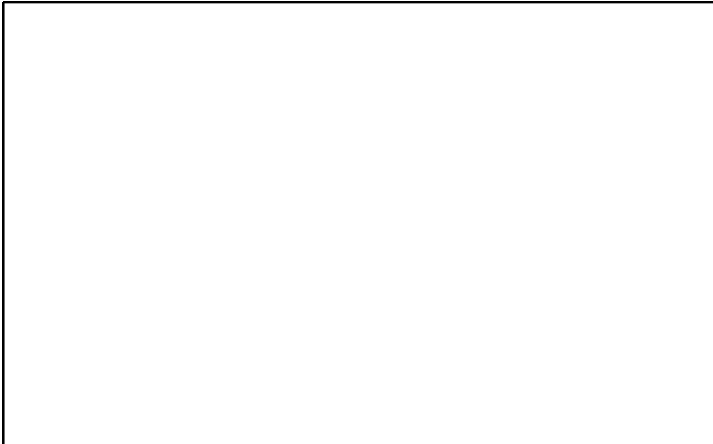
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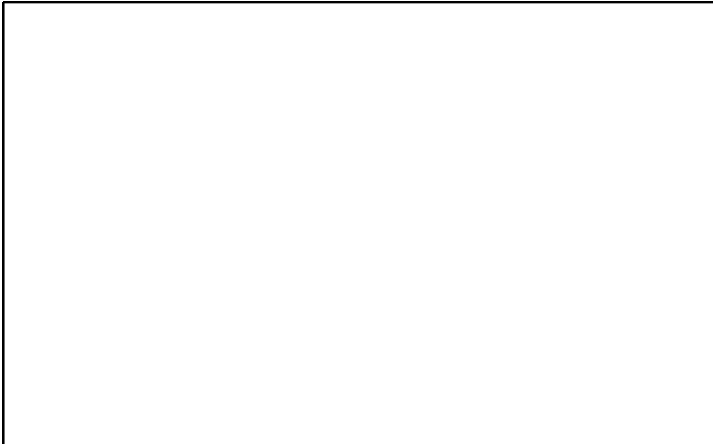
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- Make reservation
  - Pick a hotel
  - Send reservation request to that hotel

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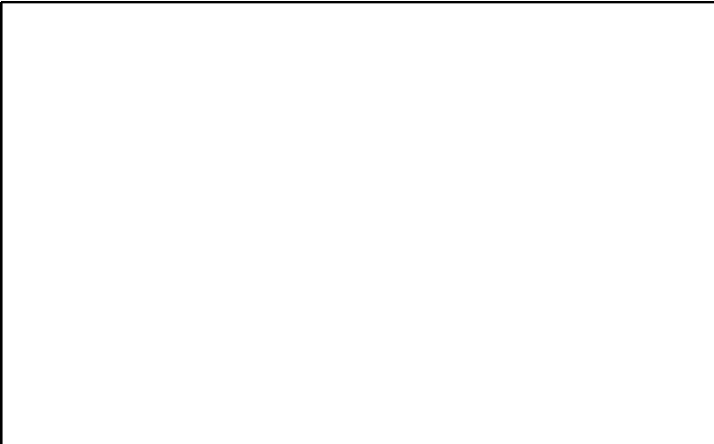


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- Cancel reservation
- Cancel reservation for a hotel

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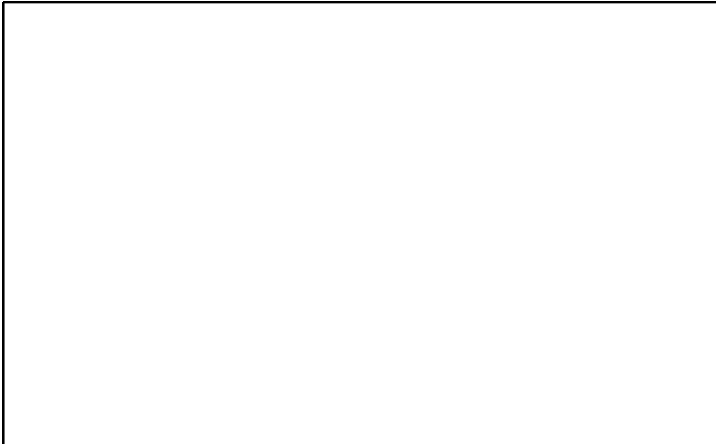


Request
- Date startDate
- Date endDate

Reservation
- Hotel hotel
- List<Room> rooms
- Date startDate
- Date endDate

ReservationRequest
- Date startDate
- Date endDate
- Map<RoomType, int> roomsNeeded

NotEnoughRoomForReservationException
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SearchHotelRequest
- Date startDate
- Date endDate
- String city
- Int groupSize

<<Enumeration>> RoomType
SINGLE DOUBLE
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+ List<Hotel> searchHotel(SearchHotelRequest r)
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# Class – Final view

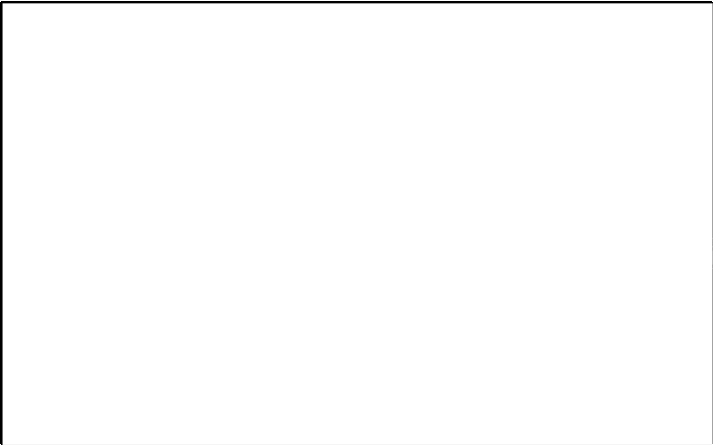


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# Challenge

- Can you add payment in your system?

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# Challenge

- Can you add payment in your system?
- Need to get price for each reservation
- Need to take a payment method

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- Can you add payment in your system?
- Need to get price for each reservation

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# Enum code sample



九章算法

```
public enum RoomType
{
    SINGLE(1, 129),
    DOUBLE(2, 199);

    private int capacity;
    private float price;

    RoomType(int capacity, float price) {
        this.capacity = capacity;
        this.price = price;
    }

    public int getCapacity()
    {
        return capacity;
    }

    public float getPrice()
    {
        return price;
    }
}
```

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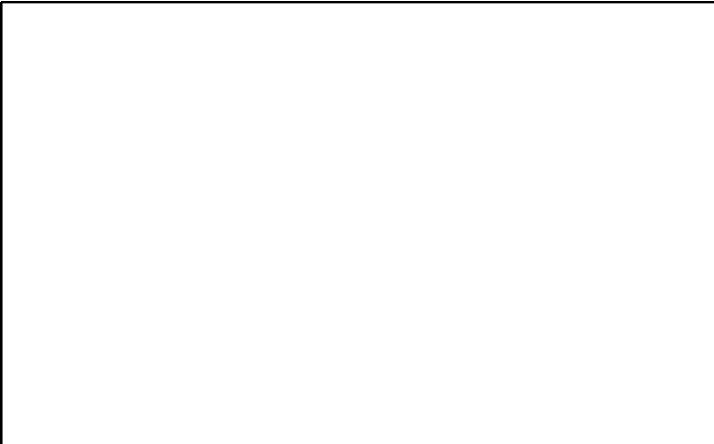
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## Good practice:

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- Strategy Pattern

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<<interface>> PaymentStrategy

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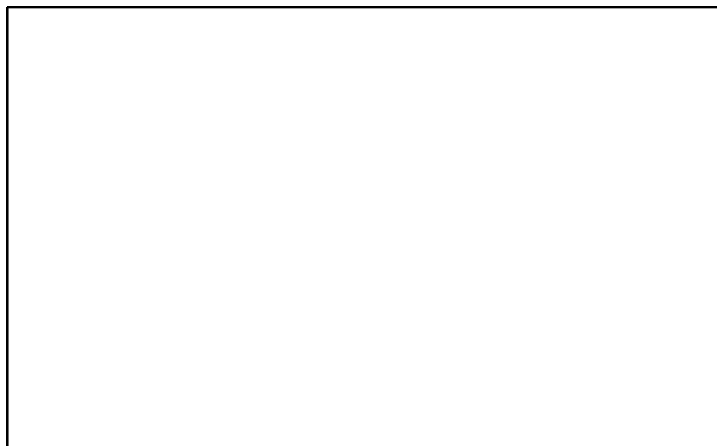


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<<interface>> PaymentStrategy
+ void pay(Reservation r)

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Request
- Date startDate - Date endDate

Reservation
- Hotel hotel - List<Room> rooms - Date startDate - Date endDate

ReservationRequest
- Date startDate - Date endDate - Map<RoomType, int> roomsNeeded

NotEnoughRoomForReservationException
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SearchHotelRequest
- Date startDate - Date endDate - String city - Int groupSize

<<Enumeration>> RoomType
SINGLE DOUBLE
- Int capacity - Float price

Room
- RoomType type - Boolean available
+ boolean isAvailable()

BookingSystem
- List<Hotel> hotels - PaymentStrategy strategy
+ List<Hotel> searchHotel(SearchHotelRequest r) + Reservation makeReservation(Hotel h, ReservationRequest r) + void cancelReservation(Reservation r)

<<interface>> PaymentStrategy
+ void pay(Reservation r)

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Request
<ul style="list-style-type: none"><li>- Date startDate</li><li>- Date endDate</li></ul>

Reservation
<ul style="list-style-type: none"><li>- Hotel hotel</li><li>- List&lt;Room&gt; rooms</li><li>- Date startDate</li><li>- Date endDate</li></ul>

ReservationRequest
<ul style="list-style-type: none"><li>- Date startDate</li><li>- Date endDate</li><li>- Map&lt;RoomType, int&gt; roomsNeeded</li></ul>

NotEnoughRoomForReservationException
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SearchHotelRequest
<ul style="list-style-type: none"><li>- Date startDate</li><li>- Date endDate</li><li>- String city</li><li>- Int groupSize</li></ul>

<<Enumeration>> RoomType
SINGLE DOUBLE
<ul style="list-style-type: none"><li>- Int capacity</li><li>- Float price</li></ul>

Room
<ul style="list-style-type: none"><li>- RoomType type</li><li>- Boolean available</li></ul>
+ boolean isAvailable()

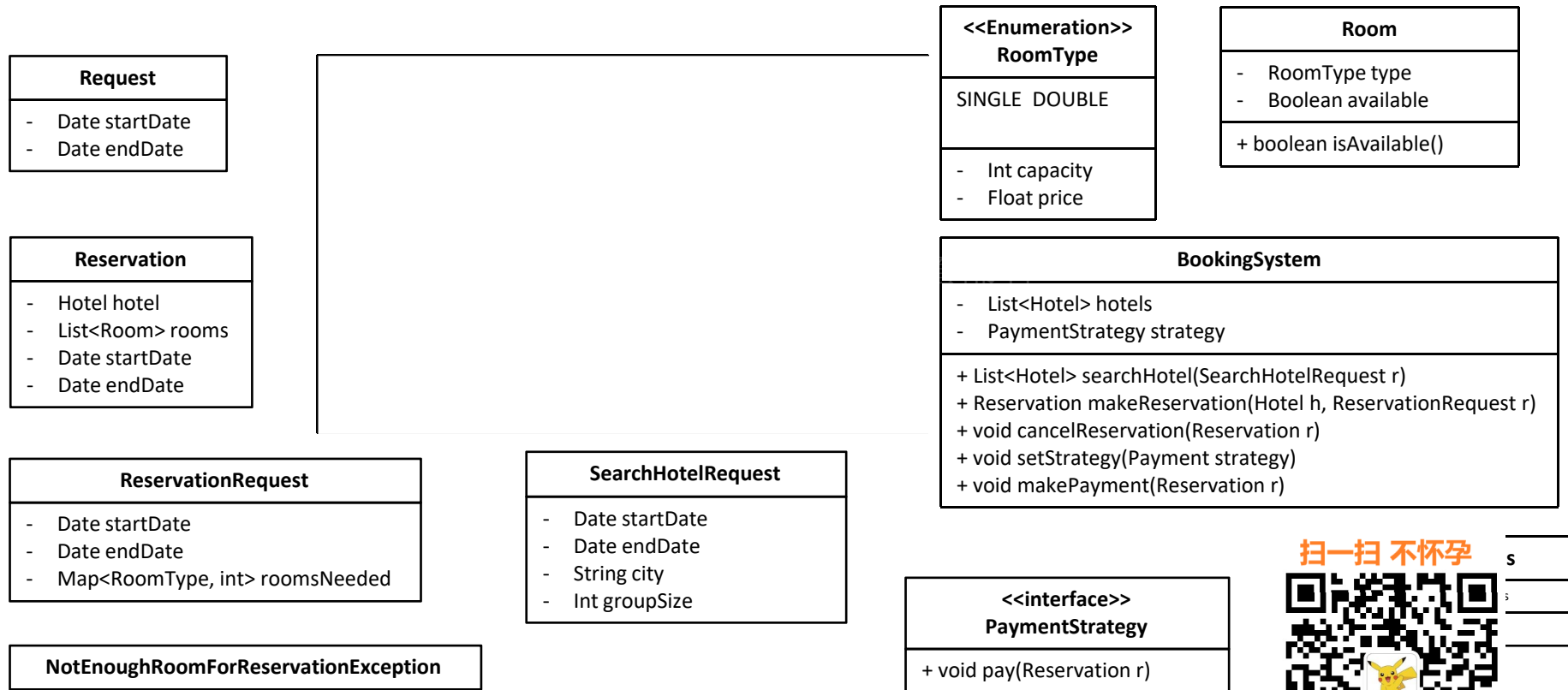
BookingSystem
<ul style="list-style-type: none"><li>- List&lt;Hotel&gt; hotels</li><li>- PaymentStrategy strategy</li></ul>
<ul style="list-style-type: none"><li>+ List&lt;Hotel&gt; searchHotel(SearchHotelRequest r)</li><li>+ Reservation makeReservation(Hotel h, ReservationRequest r)</li><li>+ void cancelReservation(Reservation r)</li><li>+ void setStrategy(Payment strategy)</li></ul>

<<interface>> PaymentStrategy
+ void pay(Reservation r)

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