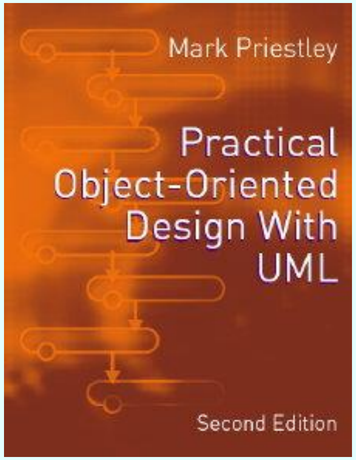
PRACTICAL OBJECT-ORIENTED DESIGN WITH UML 2e



Chapter 4: **Restaurant System: Business Modelling**

03.40.–05.09

Business Modelling

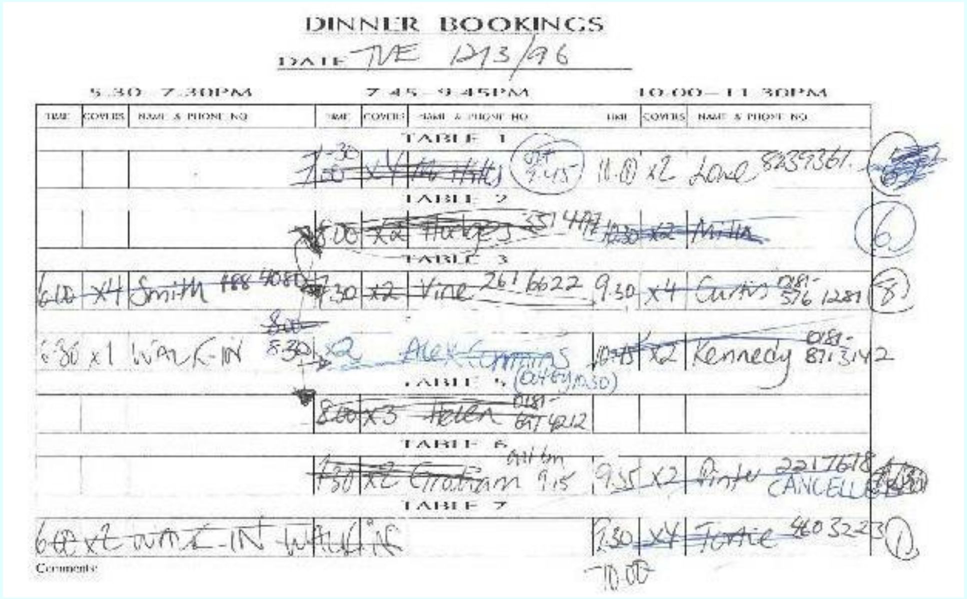
ทำไมต้องมาเข้าใจ BM.
1. เข้าใจหัวข้อที่จะทำ.
2. ใช้งานสบายยอะไรได้บ้าง.

- Early phase of development
- Inputs:
  - informal specification
- Activities:
  - create use case model
  - define use cases
  - create domain model
  - create glossary

05.10 – 09.40

Restaurant System

- Current system uses manual booking sheets



DINNER BOOKINGS

DATE TUE 12/3/96

5.30 – 7.30PM			7.45 – 9.45PM			10.00 – 11.30PM			
TIME	COVERS	NAME & PHONE NO	TIME	COVERS	NAME & PHONE NO	TIME	COVERS	NAME & PHONE NO	
			TABLE 1						
			~~7.30~~ 7-30	~~x4~~	~~Hills~~ (0181 9.45)	11.00	x2	Lowe 8239361.	[illegible]
			TABLE 2						
			~~8.00~~	~~x2~~	~~Hayes~~ 351 4497	~~10.30~~	~~x2~~	~~Milla~~	6
			TABLE 3						
6.00	~~x4~~	Smith ~~488 4080~~	7.30	~~x2~~	~~Vine~~ 261 6622	9.30	~~x4~~	~~Curtis~~ 0181-576 1281	8
6.30	x1	WALK-IN	~~8.00~~ 8.30	x2	~~Alex Cummins~~	10.15	x2	Kennedy 0181-871 3142	
			TABLE 5 (0464 10.30)						
			~~8.00~~	~~x3~~	~~Helen~~ 0181-617 4212				
			TABLE 6						
			~~7.30~~	~~x2~~	~~Graham~~ Milton 9.15	9.55	x2	~~Pinto~~ 2217618 CANCELLED	[illegible]
			TABLE 7						
6.00	x2	~~WALK-IN~~	WALK-IN			7.30 10.00	~~x4~~	~~Tortie~~ 460 3223	1

Comments

↓ 09.42 - 12.02

Current Functionality

- Advance bookings recorded on sheet
  - name and phone number of contact
  - number of diners: ‘covers’ → จำนวนของคนที่จะมากิน.
- ‘Walk-ins’ also recorded
  - number of covers only
- Bookings allocated to a table
- Cancellations etc recorded physically on booking sheet

↘ 12.02. –23.00

Define First Iteration

- First iteration should implement the minimal useful system

1. ประโยชน์การใช้งาน. → func SW. ที่ user ใช้.
2. Non-functional. → Ex ความปลอดภัย.

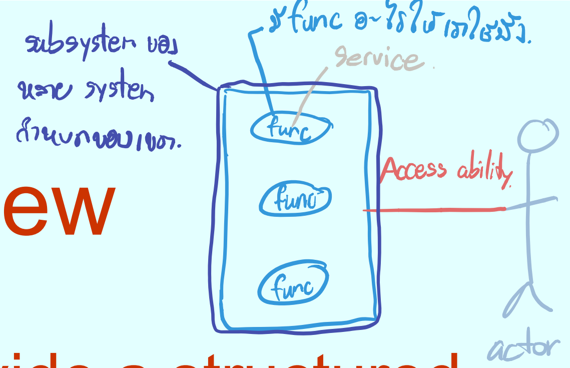
- Basic functionality:
  - record bookings
  - update booking sheet information
- System could then replace manual sheets

23.00 – 23.45.

กรณีการใช้งานต่างๆ.

Use Case View

↳ เป็นตัวแทนของ 1 service.
↳ ใครเป็น userของ serviceนั้น.



- This view is intended to provide a structured view of the system's functionality
- Based round a description of how users interact with the system
- Supported by UML *use case diagrams*
- Serves as the starting point for all subsequent development

29. 45 -31. 30

Use Cases

- The different tasks that users can perform while interacting with the system
- Preliminary list for booking system:

  1 record information about a new booking

  2 cancel a booking

  3 record the arrival of a customer

  4 move a customer from one table to another

ในการวิเคราะห์ เราเจาะจงไปที่บทบาทของคน.

$\searrow$ 31.30

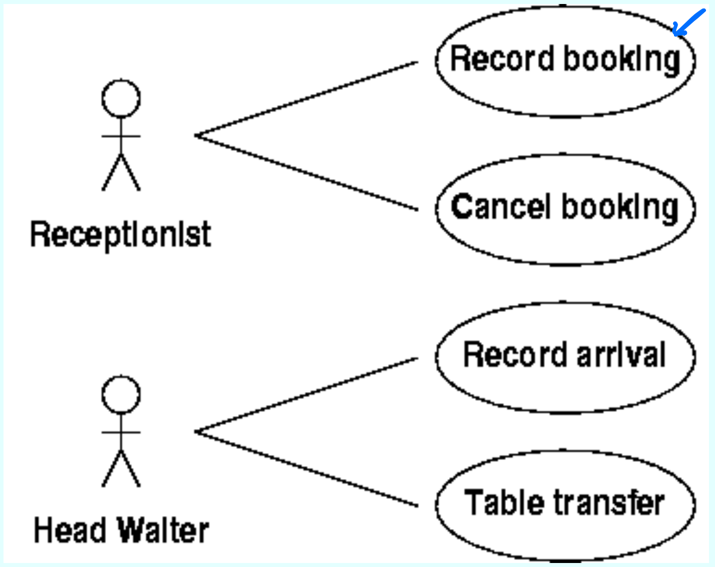
Actors

ตัวแทน ของ role.

- Actors are the roles users play when interacting with a system, eg:
  - Receptionist (makes bookings) รับโทร
  - Head waiter (assigns tables etc) รับแขก
- Individual users may play one or more role at different times
- Customers are not users of the system, hence not recorded as an actor

Use Case Diagrams

- Show use cases, actors and who does what



1 service.

$$\begin{tikzcd} & \text{basic course.} \\ \text{service} \arrow[ur] \arrow[r] \arrow[dr] & \text{alternative.} \\ & \text{exceptional.} \end{tikzcd}$$

– 48, 20.

Describing Use Cases

- A use case comprises all the possible interactions that a user can have when performing a given task
- These are described as *courses of events*, or *scenarios*
- A full description of a use case includes:

3 case.

  Ex. ถอนเงินได้.
  - a *basic course* of events กรณีปกติ.
  - an number of *alternative* and *exceptional* → ทำให้ SW ล่ม. courses

    กรณีที่ไม่ปกติ.
    Ex. แบงค์หมด, บัตรหมดอายุ

    ข้อยกเว้น.
    Ex. คนพยายามจะ Hack ระบบ, เกิด error.

48.20 - 48.58

Basic Course of Events

- This describes what happens in the 'normal' case
- For example, for 'Record Booking':

  1 receptionist enters date

  2 system displays bookings

  3 receptionist enters details

  4 system records and displays new booking
- Often a dialogue between system and user

48.59 - 49.59.

Alternative Courses of Events

- Describe predicted alternative flows
- For example, if no table is available:

  1 receptionist enters date

  2 system displays bookings

  3 no table available: end of use case

use case แทนไปที่ sevice ,actor.

49.45 - 51.07

Exceptional Courses of Events

- Situations where a mistake has been made
- E.g. allocate a booking to a small table

  1 receptionist enters date

  2 system displays bookings

  3 receptionist enters details

  4 system asks for confirmation of oversize booking

  5 if “no”, use case terminates with no booking made

  6 if “yes”, booking recorded with warning flag

↓ 54.22

เน้นไปที่บทบาทของ user

↳ actor.

Use Case Templates

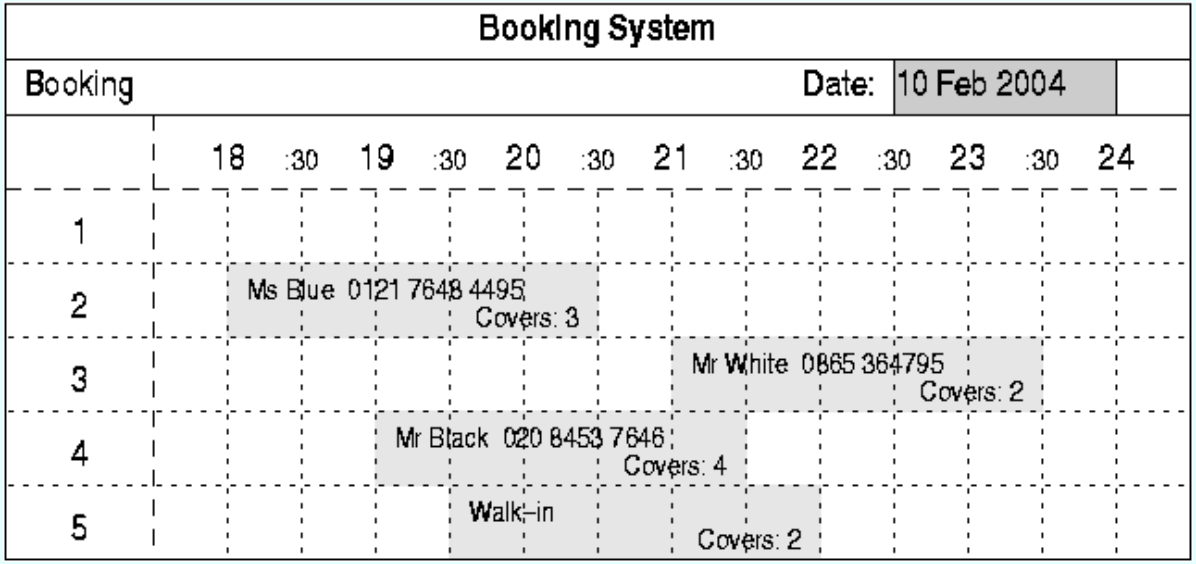
- UML does not define a standard format for use case descriptions
- Various *templates* have been defined to structure descriptions
- Essentially a list of subheadings such as:
  - name
  - actors
  - courses of events

Adobe XD → Tool ออกแบบ App.

↓ 55.00

User-interface Prototype

- When writing use cases, it is useful to have a rough idea of the planned user interface



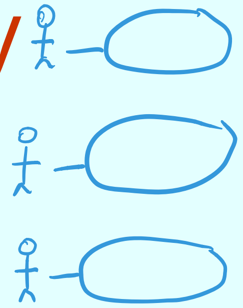
Booking System

Booking Date: 10 Feb 2004

	18	:30	19	:30	20	:30	21	:30	22	:30	23	:30	24
1													
2	Ms Blue 0121 7648 4495 Covers: 3												
3							Mr White 0865 364795 Covers: 2						
4			Mr Black 020 8453 7646 Covers: 4										
5				Walk-in Covers: 2									

1.02.10.

Shared Functionality



- Different use cases can overlap

use case บางอันซ้ำซ้อนกัน.

- E.g. 'Record Arrival':
  - – head waiter enters date
  - – system displays bookings
  - – head waiter confirms arrival for booking
  - – system records this and updates display
- First two steps shared with 'Record Booking' (even though different actor)

↓ 1.02.30

Use Case Inclusion

- Move shared functionality to a separate use case, eg ‘Display Bookings’:

  1 user enters a date

  2 system displays bookings for that date

Booking เหมือนเป็น function call ที่ถูกเรียกซ้ำๆ.

- *Include* this in other use cases:

  1 receptionist performs ‘Display Bookings’

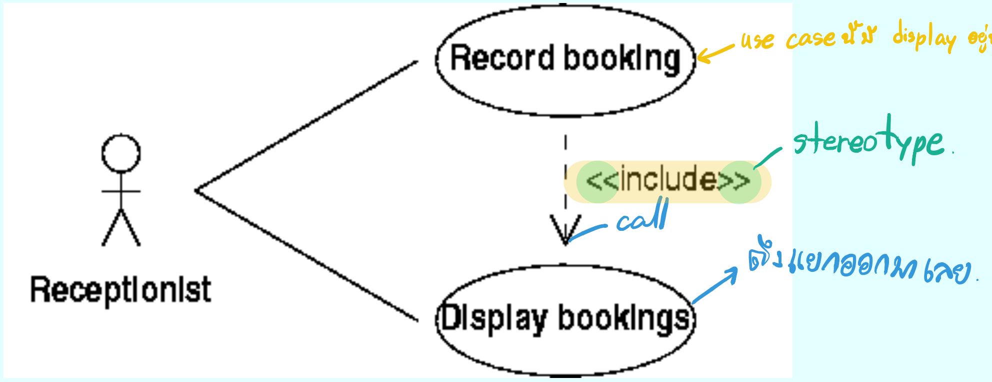
  2 receptionist enters details

  3 system records and displays new booking

1.10.50

The ‘include’ Dependency

- UML shows inclusion as a *dependency* between use cases, labelled with the stereotype *include:*

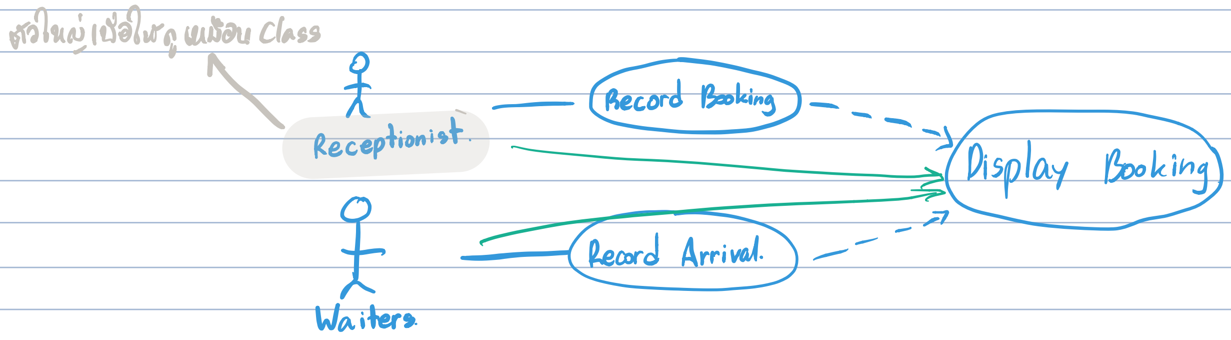


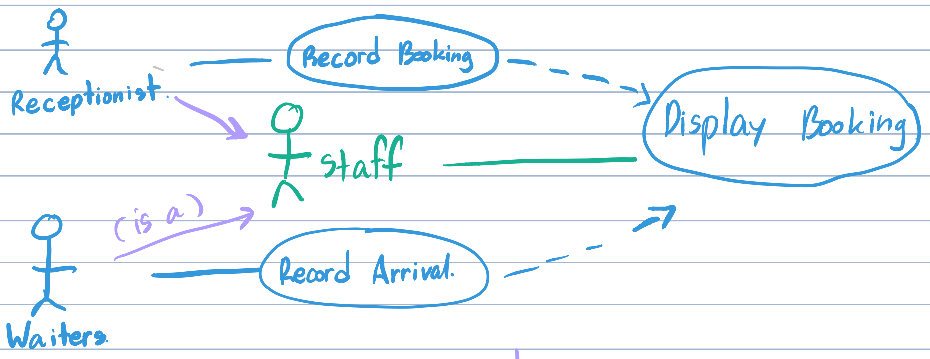
1.11.23.

ความเหมือนของ Actor.

Actor Generalization

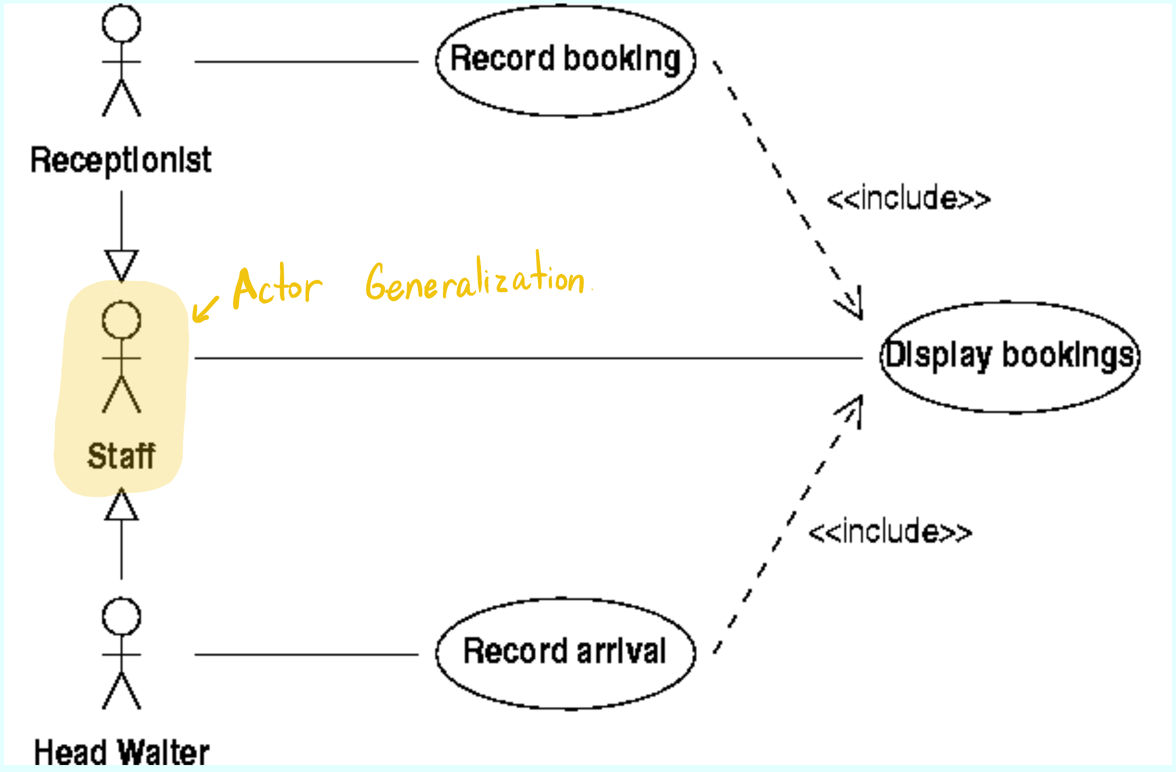
- This diagram shows that the receptionist can display bookings without performing the including use case ‘Record Booking’
- Head waiters can also display bookings
- Introduce a more general actor to show what the other two actors have in common
- The initial actors are *specializations* of the general actor


ตัวใหญ่ เพื่อให้ดู เหมือน Class
Receptionist.
Record Booking
Display Booking
Record Arrival.
Waiters


Receptionist.
Record Booking
Display Booking
Staff
(is a)
Record Arrival.
Waiters

next page

Actor Generalization Notation



1.22.44

ความคล้ายคลึงระหว่าง use case กับ use case.

Use Case Extension

$$\begin{tikzcd} \boxed{UC1} \\ \boxed{UC2} \arrow[u, dashed, "\ll extend \gg"'] \end{tikzcd}$$

เป็นไปตามบ่อยก็ได้ uc2.

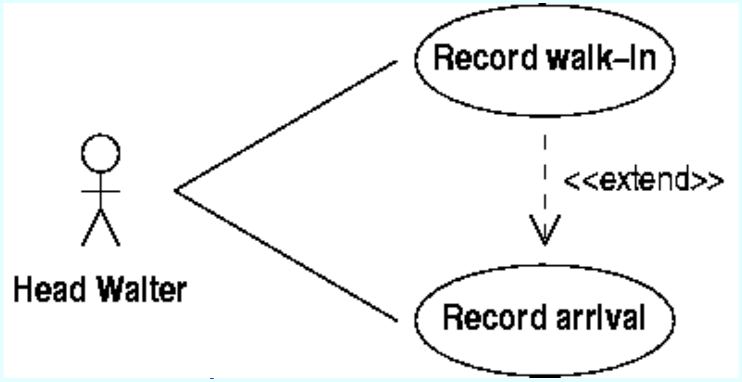
- Recording a walk-in can be described as an exceptional source of events
  - someone arrives but there’s no booking recorded
- It could also be a separate use case
  - a customer arrives and asks if there's a free table
- Then it can *extend* ‘Record Arrival’

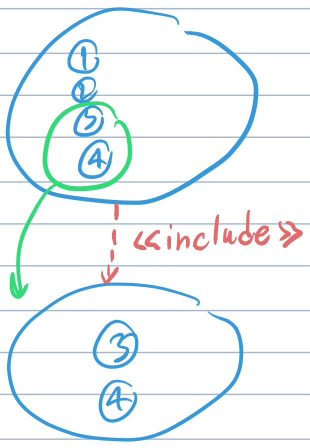
  - walk-in
  - Booking.
  - even without a booking, the customer stays to eat

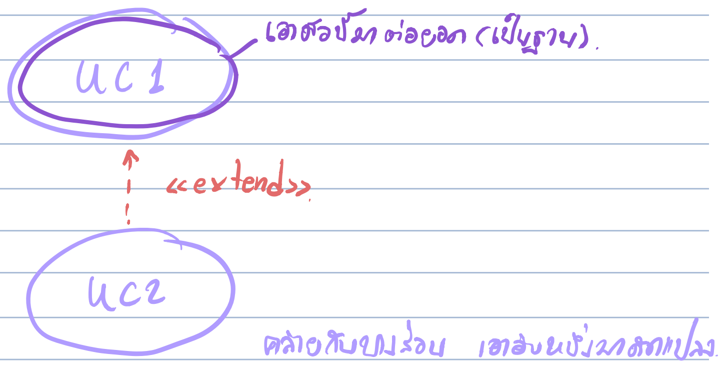
↓. 1.25.15

The ‘extend’ Dependency

- Use case *extension* is shown with a dependency. ‘`Record walk-in`’ is not performed every time ‘`Record arrival`’ is performed. In certain circumstances, the ‘`Record arrival`’ use case can be extended by the ‘`Record walk-in`’ use case.



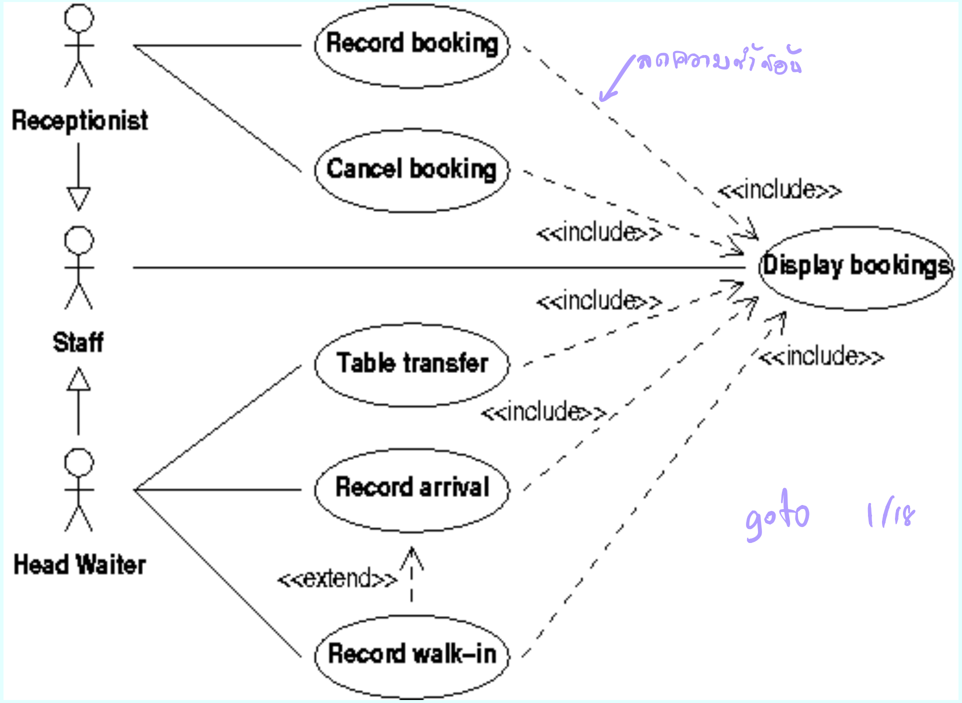

1
2
3
4
<<include>>
3
4


UC 1
เอาสิ่งนี้มาต่อยอด (เป็นฐาน).
<<extend>>
UC2
คล้ายกับบทร่วม เอาส่วนหนึ่งมาดัดแปลง.

1.09.36

1.34.13

Complete Use Case Diagram



มองในแง่ของ Class ในระบบมี Object อะไรบ้าง.

1.36.45.

Domain Modelling

- Using UML to construct a model of the real-world system
  - similar to entity-relationship modelling
- Model recorded as a class diagram
- ‘Seamless development’
  - same notation used for analysis and design
  - design can evolve from initial domain model

$\downarrow$ 1.39.15

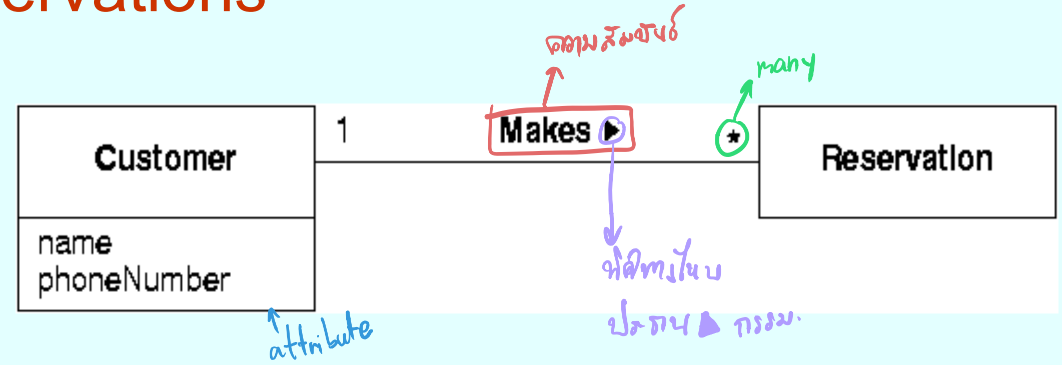
Domain Model Notation

- Subset of class diagram notation
  - **classes** represent real-world entities
  - **associations** represent relationships between the entities
  - **attributes** represent the data held about entities
  - **generalization** (super class, sub class) can be used to simplify the structure of the model

1.39.40

Customers and Reservations

- Basic business fact: customers make reservations



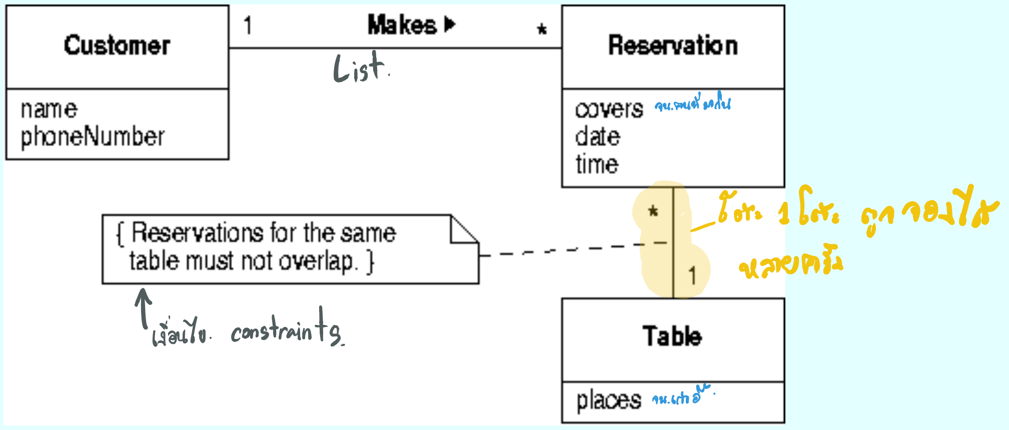
Defining a Relationship

- Give a name to the relationship
  - use a verb so that the relationship can be read as a sentence
- A customer can make many reservations
- How many people make a reservation?
  - one principal contact whose details are held
  - the expected number of diners can be modelled as an attribute of the reservation

1.41.50

Tables

- Is table number an attribute of 'Reservation'?
- Better modelled as a separate class
  - tables exist even if there are no reservations
  - other attributes of tables, e.g. size, can be stored



$\downarrow$ 1.46.30

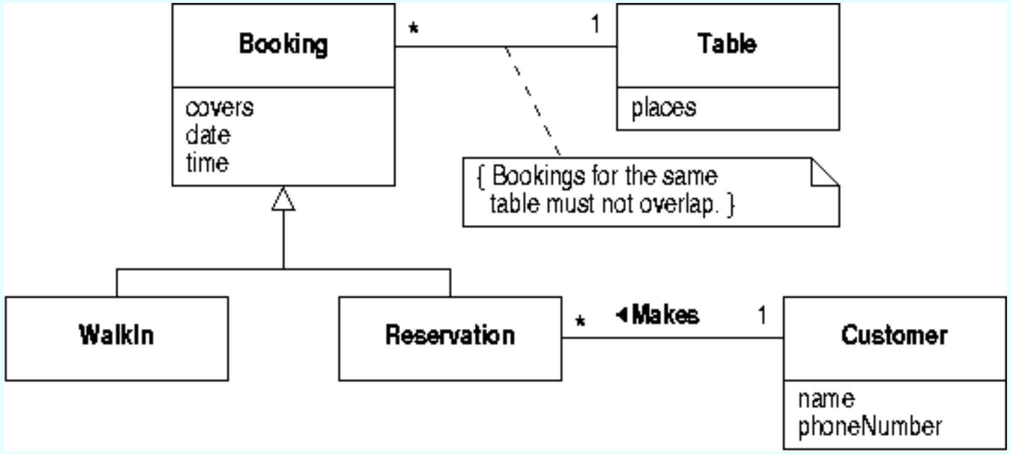
Constraints

- Not all domain properties can be shown graphically
  - e.g. it should be impossible to double-book a table
- *Constraints* add information to models
  - written in a *note* connected to the model element being constrained

↓ 1.46.40

Use of Generalization

- A superclass can be used to show the properties shared by different types of booking



↓ 1.48.45

Correctness

- How do we know when a domain model is complete?
  - we don't: there are lots of plausible models in most cases
- Domain modelling is not an end in itself, but a guide to further development
- Realizing use cases *tests* the domain model, and will usually lead to refinements

$\downarrow$ 1.49.25

Glossaries

เขียนอธิบายออกมา. Ex. walk-in หมายถึงอะไร.

- Domain models capture important system concepts
- Useful to record these terms and their definitions for use throughout a project
- Do this in the form of a *glossary*

$\downarrow$ 1.51.40

Partial Restaurant Glossary

Ex.

- **Booking**: an assignment of diners to a table
- **Covers**: the number of diners for a booking
- **Customer**: a person who makes a reservation
- **Reservation**: a booking made in advance
- **Walk-in**: a booking that is not made in advance