



CO1605

Systems Analysis and Database Design

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C&T Building Room CM214

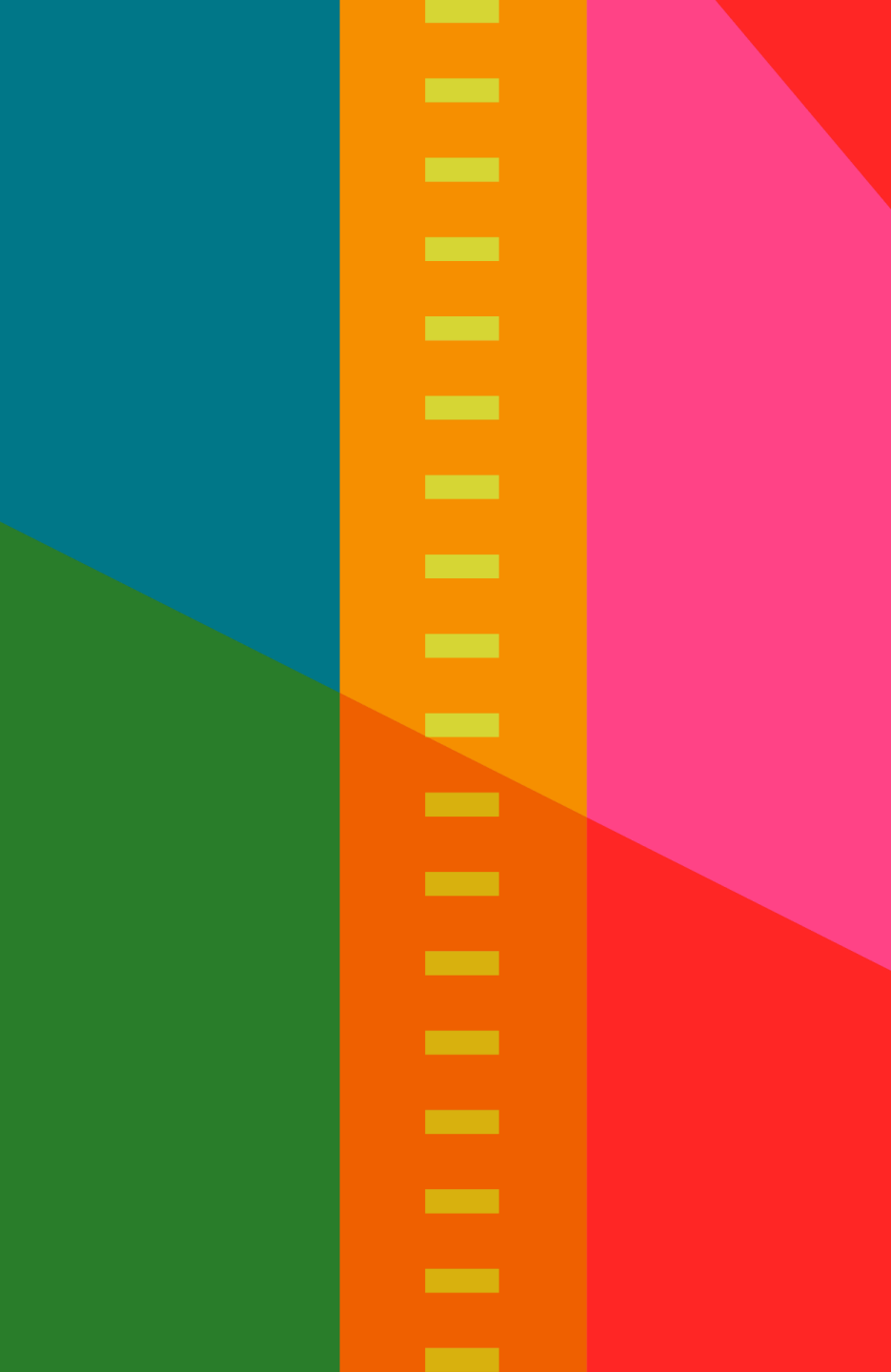
Expectations:

In this class, please be respectful, kind, and supportive to others

- Arrive on time to all classes
- Be ready to learn at the start of the class, sitting down with paper, pen, notes, calculator or anything else you need
- Actively listen when someone else is speaking
- Keep focussed on your learning
- Take care not to disrupt anyone else's learning: keep quiet, still and focussed
- Participate in all class activities
- Keep your phone on silent and do not take calls or check your phone in class
- Ask questions

UML: Unified Modelling Language

Describing Use Cases with Activity Diagrams



Learning Outcomes

Students will be able to:

- Identify elements of a variety of diagrams
- Draw (refine) use case diagrams
- Describe a use case using activity diagrams
- Understand the terminology of the Diagrams

Use Case Diagrams

A Quick Recap



Amy's Cupcakes



Amy's Cupcakes is a local bakery, on the edge of Preston. Amy started the business about a year ago working out of her own kitchen. She has been an avid baker ever since she was a child, baking for family, and local events. Friends and family were constantly telling her how amazing her cupcakes were and that she should start a business. Tentatively she decided to give it a go, thinking she would probably never have enough customers to make it work. However, the business took off very quickly, and within three months she realised that her kitchen was too small, and she would need some proper premises. When a small bakery shop came up for rent a couple of miles from her home, she took the plunge Amy now currently employs 6 members of staff who work part-time shifts, and their responsibilities include: baking the cupcakes, selling in the shop, trips to the wholesalers to collect ingredients, and cleaning duties.

Currently, the bakery sells around 500 cupcakes every day. Each morning the bakery staff make several batches of cupcakes in different flavours and with different icings and decorations. These go onto the counter and are almost always all sold by the end of the day.

As well as the shop sales, the bakery takes orders for birthdays, weddings, and parties, etc. Orders usually come in via telephone, or sometimes over the counter, and are written down in a sales order book. There is a set order/price list that the customer can choose from. This list is on display in the shop and can be emailed to the customer on request. If the customer has a special request for something that isn't on the list, e.g. a vegan or gluten free version, this is noted down on the order sheet.

The order side of the business is proving very popular, however, Amy struggles to keep track of how many orders she has pending for a particular day, and making sure there are enough ingredients on hand for both the orders and day to day baking for the shop.

At the moment, the bakery does not keep a record of ingredients in stock. To see how much they have of any particular item they just go and look in the pantry. Consequently, they often run short of ingredients for an order and Amy has to make a quick trip to the wholesalers. There have been a few occasions where they have not met an order on time.

As well as the sales of the cupcakes, the shop also stocks a variety of baking merchandise such as cake boxes, cupcake cases, cake decorations, flavourings, and colourings, etc. They get quite a few customers ordering over the telephone and asking for their order to be delivered, however, Amy doesn't feel that she can deal with this side of things at the moment, on top of everything else, and so currently customers have to come and collect their order from the shop.

Amy has also recently started running a Cupcake Baking Workshop once every month. The workshops are based around themes, such as Christmas, Halloween, Vegan Baking, etc. and are advertised via posters/leaflets which are given out to other local shops and businesses. The workshops currently cost £15 per class and the customers get to take home their bakes and receive a certificate at the end of the session. So far these have been fully booked and there is now a waiting list for classes.

As the shop is proving to be very successful, Amy now has plans to open another shop nearer to the town centre within the year. She has a very limited budget, but realises that if she is going to improve the viability of the business, she must invest in a new information system to help her keep track of things better.

Amy's Cupcakes - Identifying the Actors



Customer



Sales Assistant



Baker



Stock Keeper



Workshop Manager



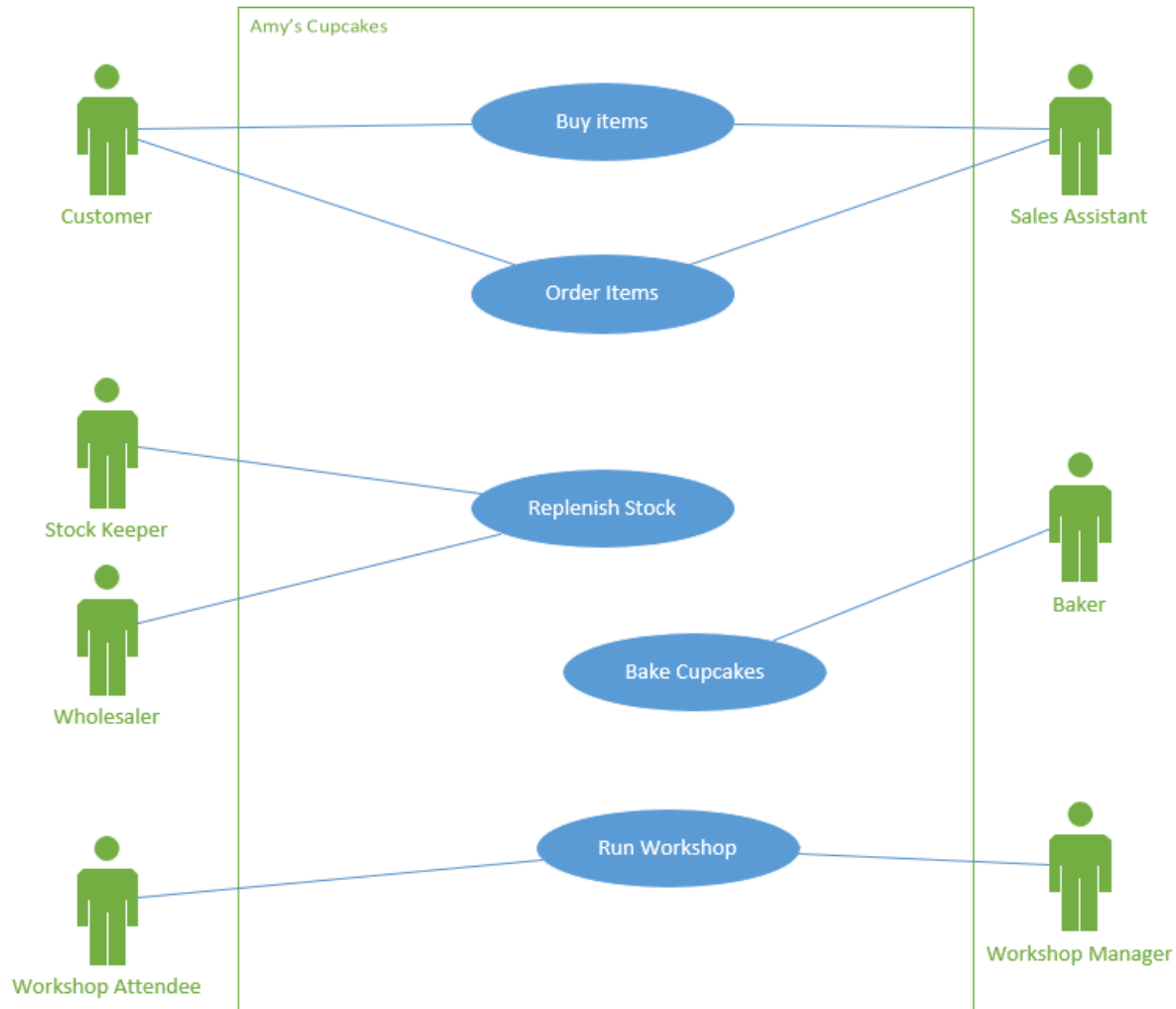
Workshop Attendee



Wholesaler



Amy's Cupcakes - Use Case Diagram



<<include>> - common functionality

Examples:

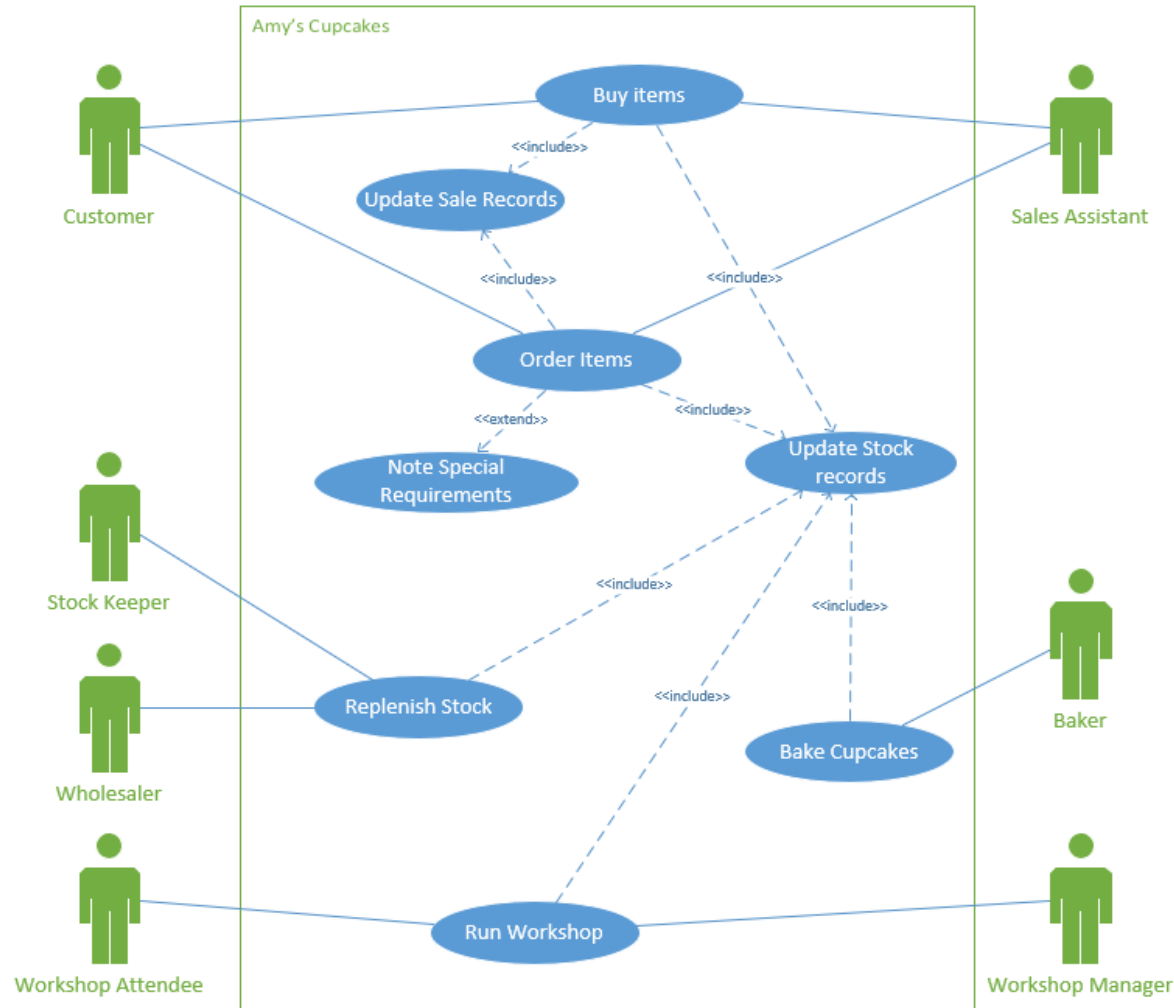
- Update sale records
- Update stock records

<<extend>> - failures or differences

Examples:

- Note special requirements
- Sale declined

Amy's Cupcakes - Use Case Diagram



**With added
includes and
extends**

KYA Karate Club

KYA Karate Club is an independent family run club offering self-defence classes to its members. An interview with KYA's owner, Ernie has provided the following information.

Ernie is a martial arts enthusiast and after reaching his Dan status in 2005, decided to start his own club. The club now has approximately 200 members of all ages and abilities spread around the local area. Ernie runs training sessions most evenings using church halls in Burnley, Preston, and Carlisle.

Each member carries a membership card (example 1), which is date stamped every time they attend a training session. Their attendance is also recorded in Ernie's attendance ledger (example 2). Members pay a small fee, which is currently £3, for attending any session. This money is used primarily for the hire of the halls and Ernie's expenses for running the club. He also stocks and sells karate suits in a variety of sizes, and grade belts (white, yellow, orange, green, blue, purple, brown and black) to supplement this. He keeps all of his records on paper, but uses his laptop to make forms which allow him to keep accurate records of attendance, member details, etc. With his membership numbers growing at an increasing rate, he is finding it more and more difficult to keep his records up to date. Ernie has a card system (example 3) for recording his member's personal details and achievements to date.

He usually holds grading sessions twice a year for members who he feels are ready to progress to the next grade and who have attended the minimum number of training sessions required. At least a week prior to the grading event, members who are grading have to pay a grading fee, which is currently £20, and give Ernie their karate licence (a small document which holds a photograph of the member and a signed declaration that they promise to uphold the true spirit of Karate, etc). During the grading session, each member is assessed against pre-defined criteria by a panel of Dan grades and is awarded an average mark based on their performance. On completion of the grading session, each successful grader is awarded a certificate, their licence is updated, and they have the opportunity to buy the belt applicable to their new grade.

Ernie's membership is increased throughout the year by recommendations from existing members, but he has found that printing leaflets and posters that his members take to school/college/work to advertise the clubs and to offer a free training session to anyone, is a very successful way of attracting new members. He has done this several times over the last few years.

Example 1: Membership Card

Example 2: Attendance Ledger

Preston Club

Name	M Number	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date
William Averb	P01	13/4	20/4	27/4	4/5						
Willa Averb	P02	13/4	20/4	4/5	11/5						
Wendy Averb	P03	20/4	27/4	4/5	11/5						
Ryan Kigworth	P04	13/4	27/4	4/5							
Hari Kumar	P05	5/5	20/4	27/4	4/5	11/5					
Melanie Kellat	P06	13/4	4/5	11/5							
Tony Abbot	P07	20/4	4/5								
Thomas West	P08	13/4	11/5								
Maureen Johnson	P09	13/4	20/4	4/5	11/5						
Tony Alabross	P10	27/4	4/5								
Thomas Hardy	P11	13/4	20/4	4/5							
Daniel Hamilton	P12	4/5	11/5								
Simon Crowther	P13	4/5	11/5								
Steve Westlake	P14	13/4	20/4	4/5	11/5						



Example 3: Member Card

Member No: P06	
Name: Melanie Kellat	
Address: 93 Houghton Lane, Houghton, Lancashire	
Postcode: PR5 5J	
Joined Club: 3rd March 2005	
Date of Birth: 04/05/1989	
Home Tel: 01254 963753	
Mobile:	
Belts Achieved:	
Yellow: 24/7/05 Orange: 11/12/05 Green: 25/6/2006 Blue: 1/9/07	
Purple: 29/6/2008	

KYA Karate Club - Identify the Actors



Sensei



Record keeper



Shop Keeper



Grader

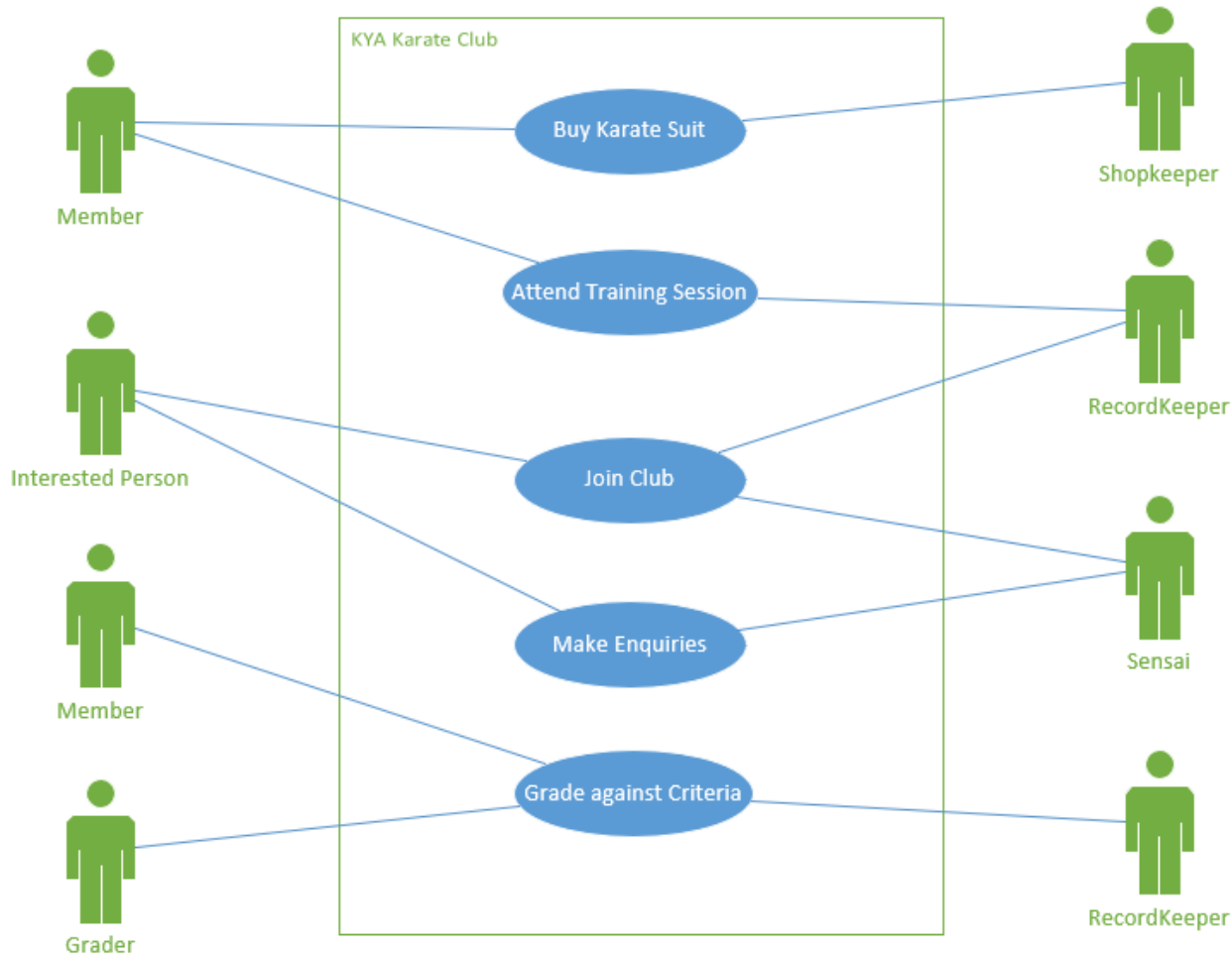


Member



Interested person

KYA Karate Club - Use Case Diagram



<<include>> - common functionality

Examples:

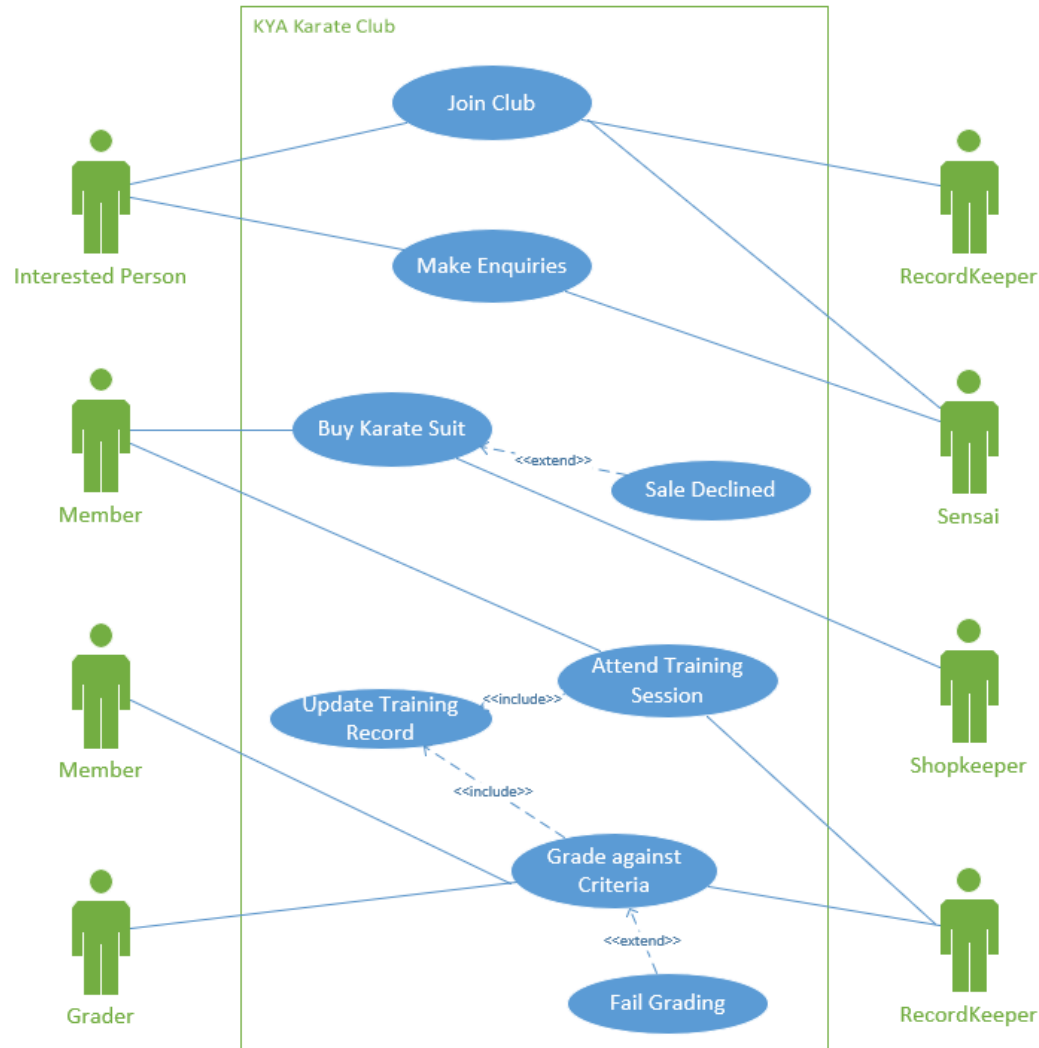
- Update training record
- Update stock records (If we add a supplier and appropriate use case)

<<extend>> - failures or differences

Examples:

- Fail the grading
- Sale declined

KYA Karate Club - Use Case Diagram



With added
includes and
extends

Describing Use Cases

- **Activity Diagrams**
- **Textual Descriptions**
- Sequence Diagrams
- Communication Diagrams



Attend Training Session



Join Club

Activity Diagrams

Behaviour Diagram: describes what must happen in the system

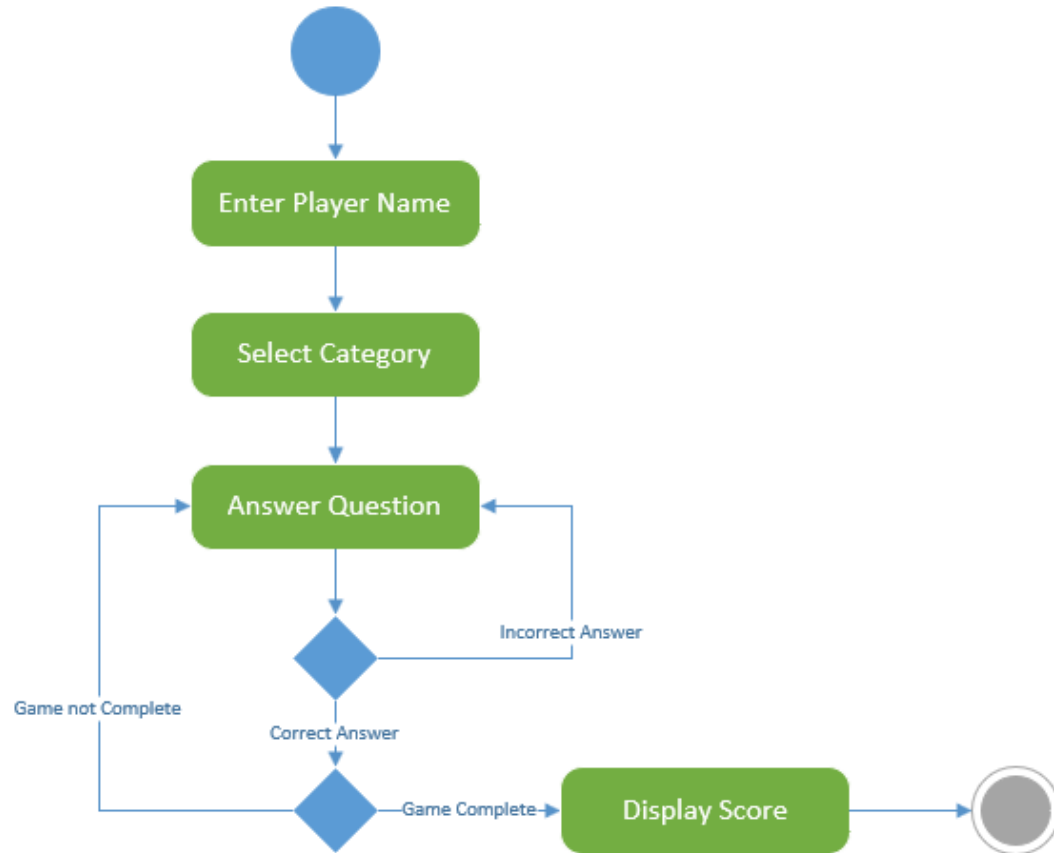
Describe the steps performed within a use case

Shows the flow of activity

Low level detail of a particular operation

An activity diagram tells the story of what happens in a use case

Activity Diagram Notation



Start node: diagrams only contain one



Activity: a step in the process - a task is performed



Control flow: the arrows that show the flow between the steps (also known as action flows, connectors, edges, or paths)

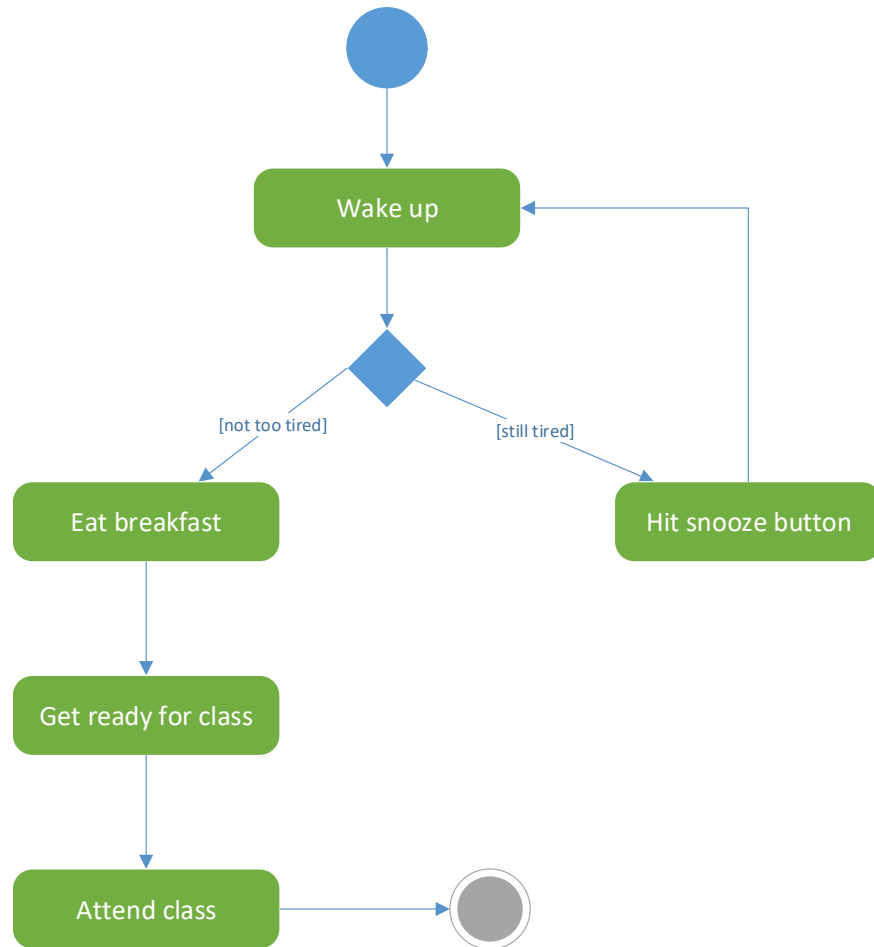


Decision node: a conditional branch represented by a diamond - includes a single input and 2 or more outputs



End node: diagrams can contain more than one

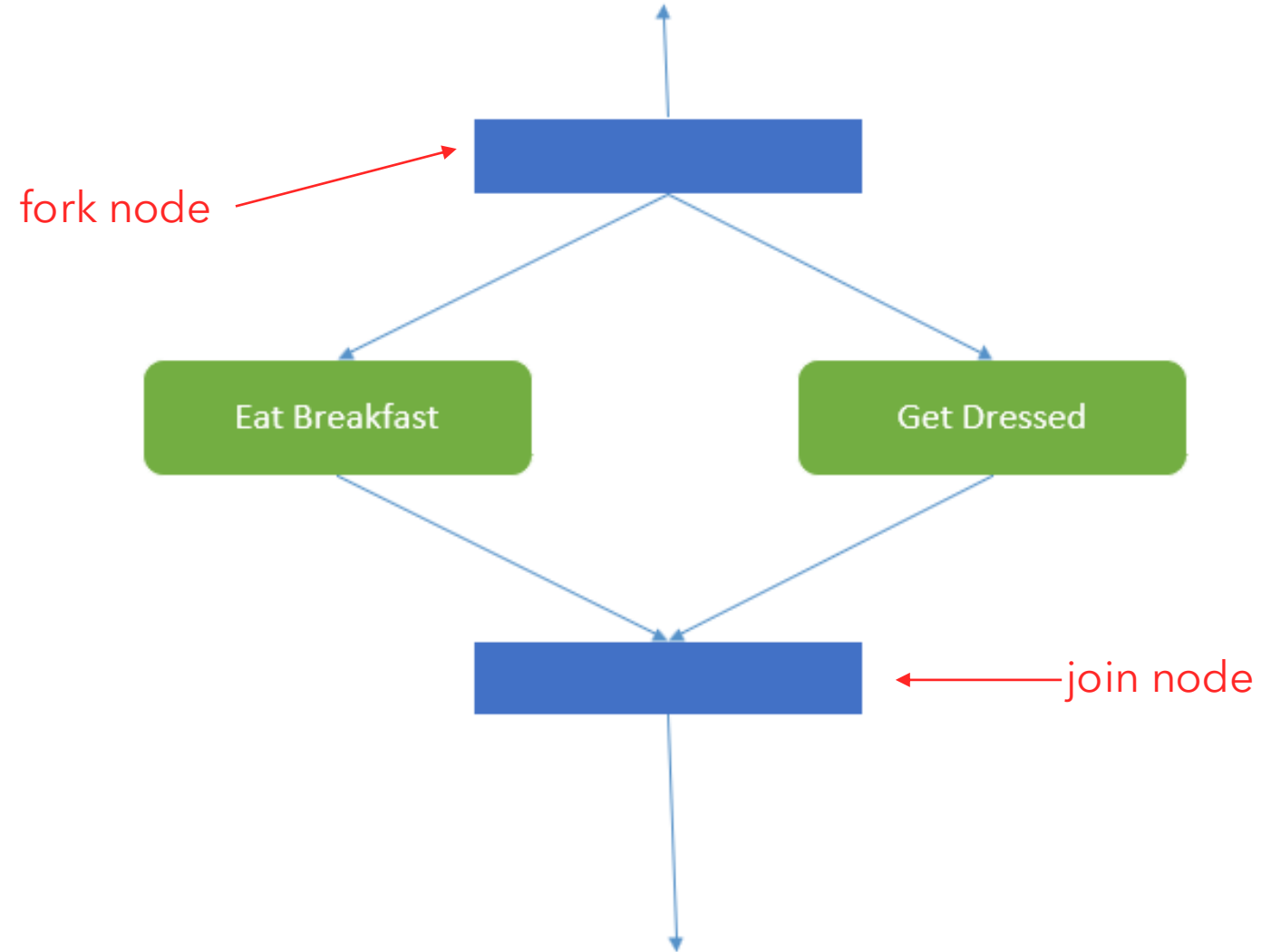
Activity Diagram Notation



The Story:

The story starts when the student wakes up to the sound of the alarm. If they are still tired, they will hit the snooze button and go back to sleep. If they are not tired, they will get up and go eat some breakfast. After they have eaten, they will get dressed and ready for their class. They will then attend the class, and that is where the story ends.

Concurrent Paths

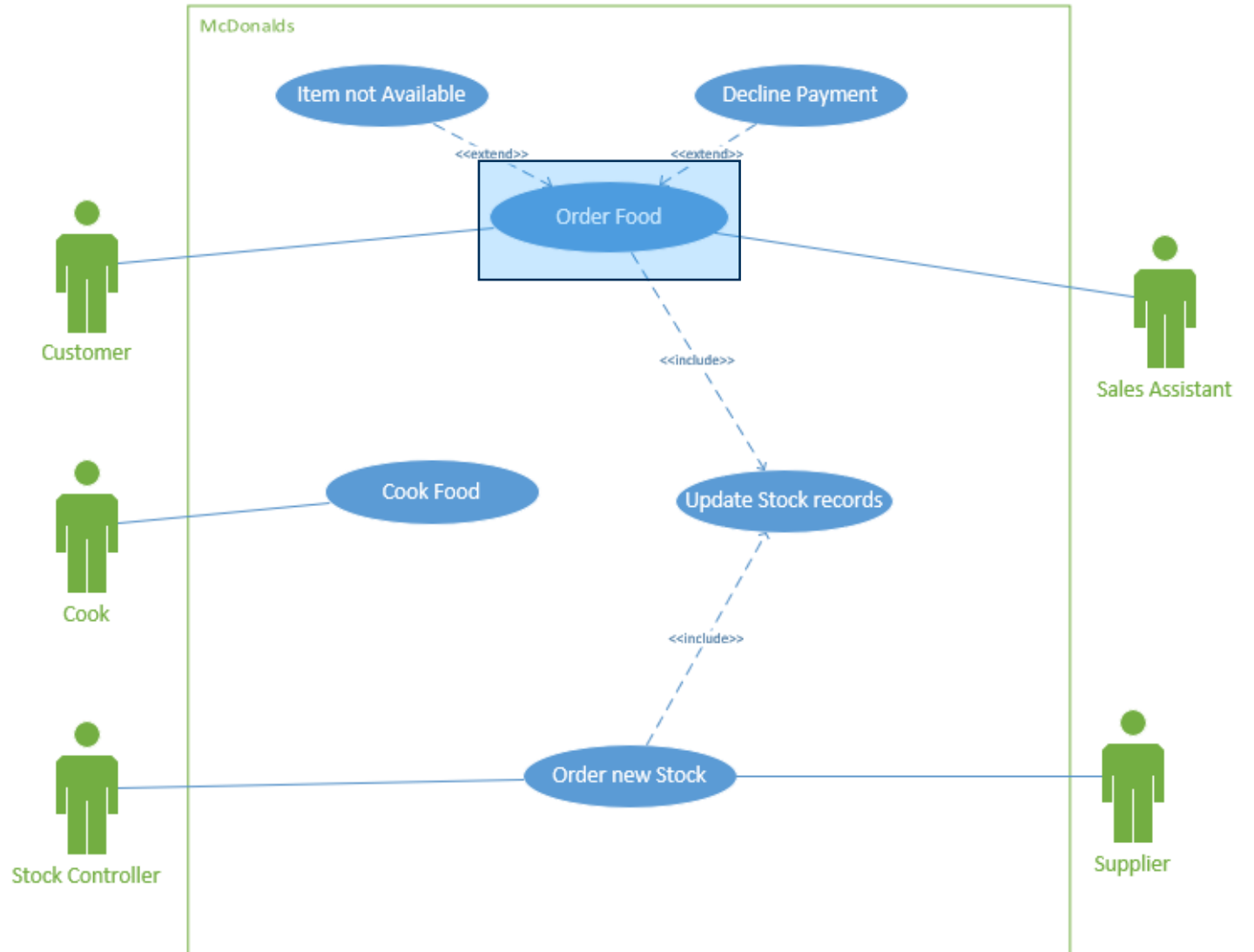


Actions happening at the same time

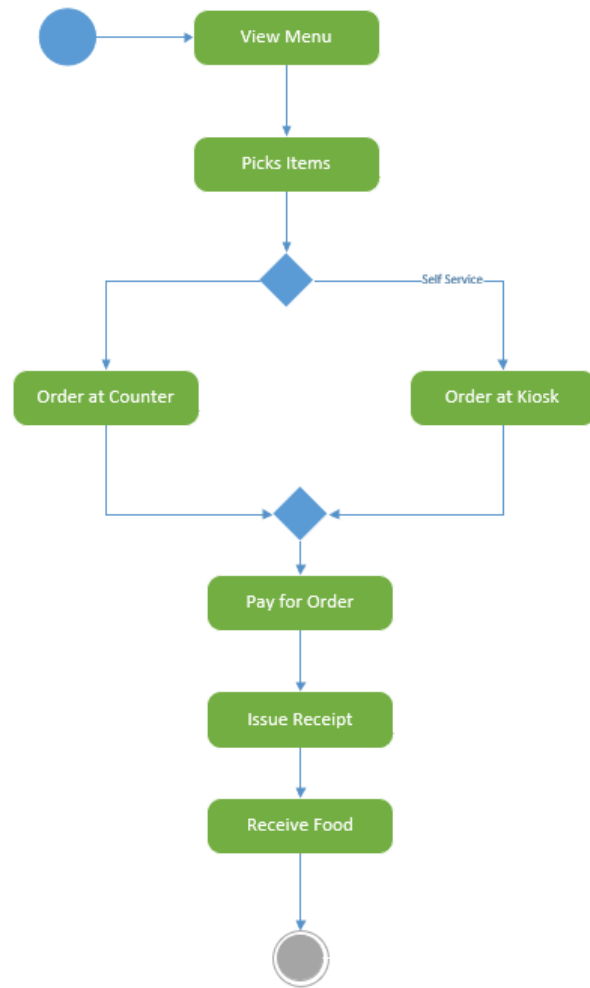


McDonalds Use Case Diagram:

describing the Order Food use case as an Activity Diagram



McDonalds: Activity Diagram for the Order Food use case

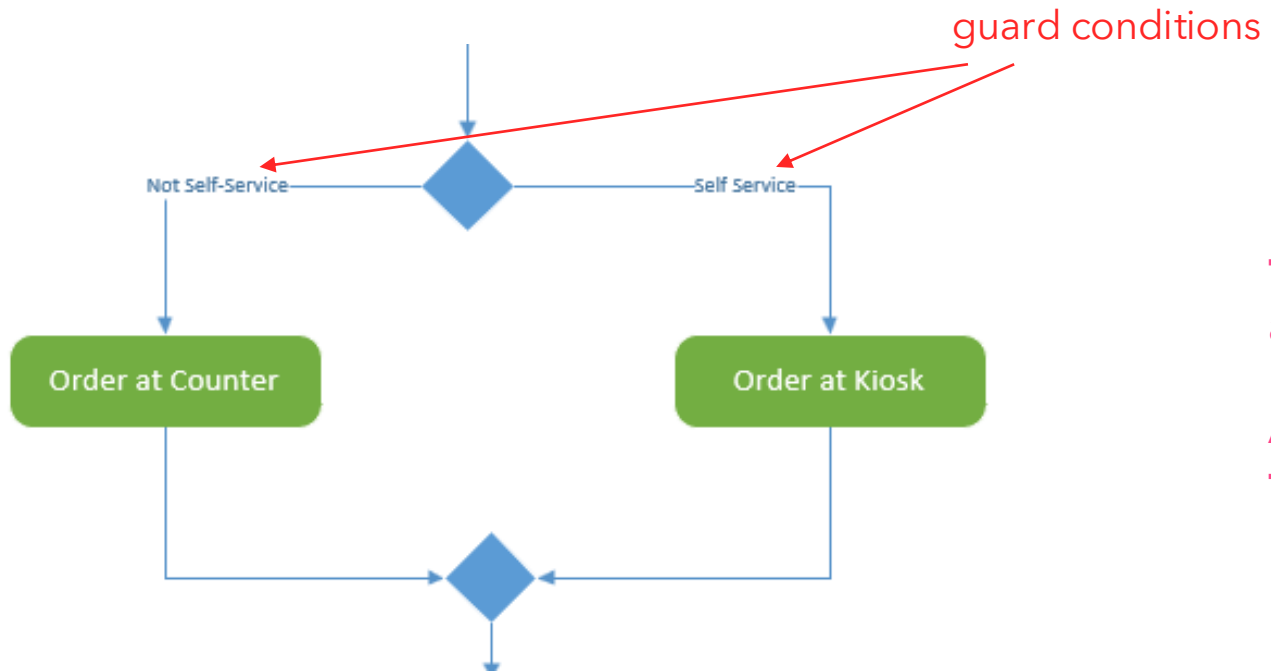


The Story:

The story starts when the customer views the menu. They pick the items that they would like to order. They make a decision as to whether to order at the kiosk or the counter. They place their order. They pay for their order. They are issued with a receipt.. They receive their food, and that is where the story ends.

The decision node shows the two different ways of ordering food

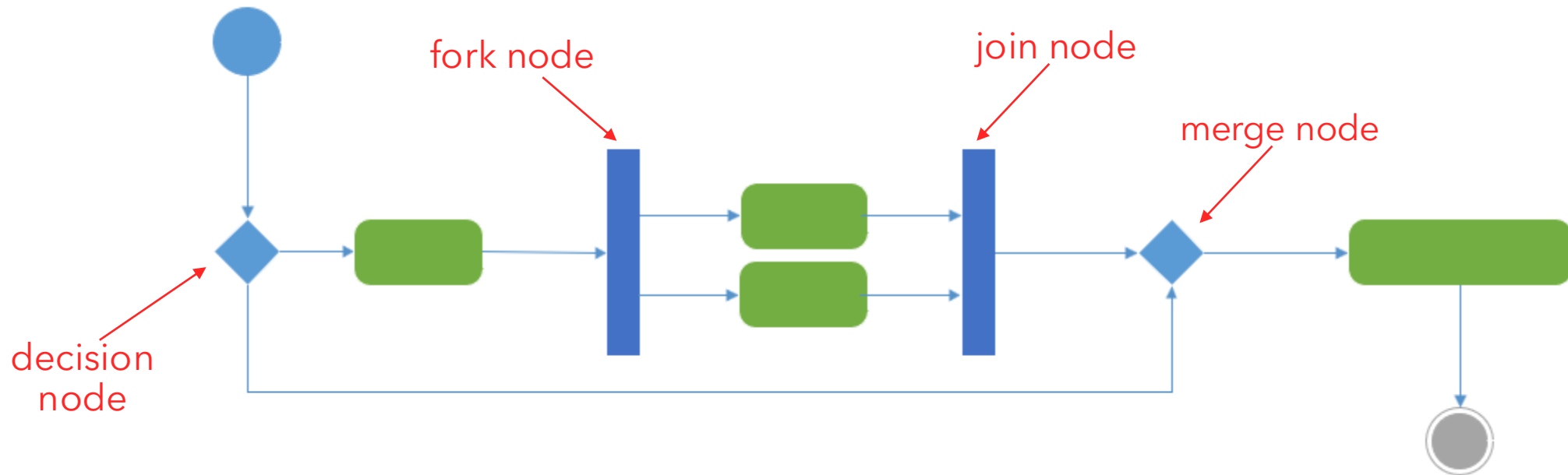
Guard Conditions



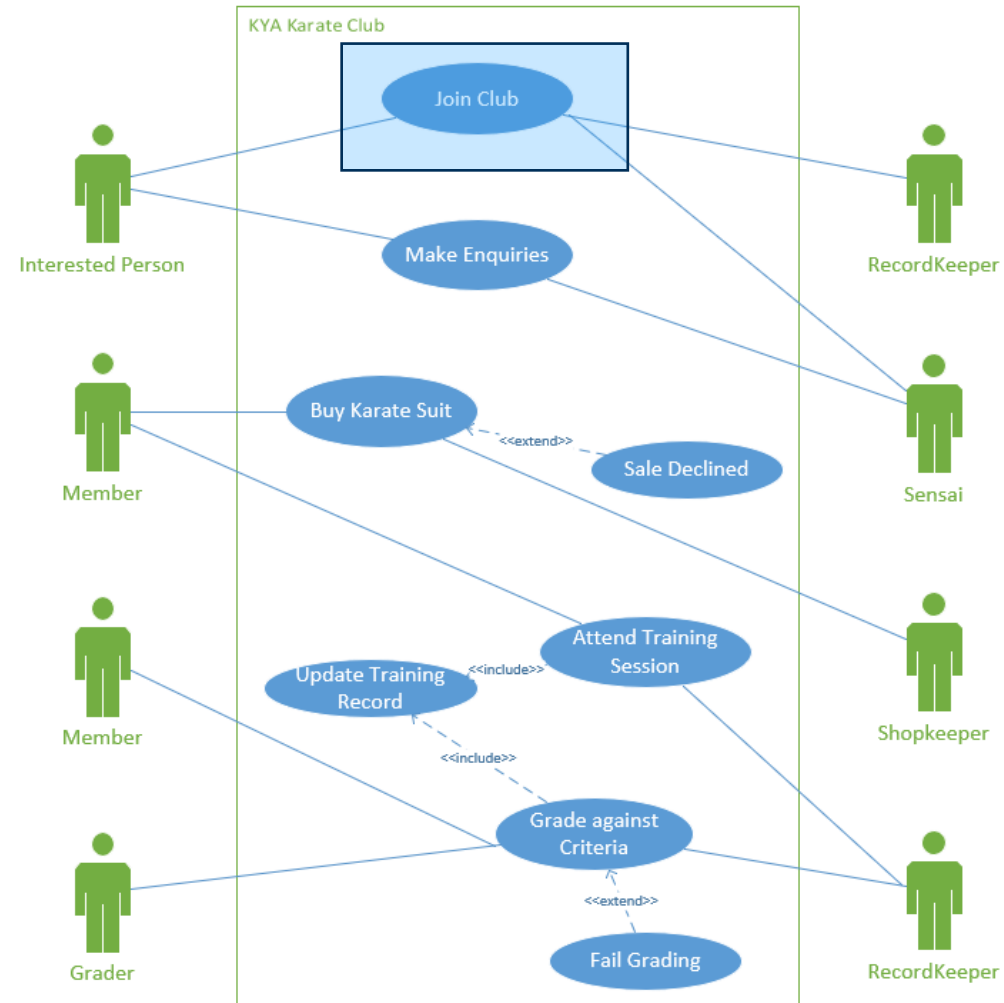
The flows out of a decision node usually contain at least one 'Guard Condition'

A guard is a condition that must be true in order to traverse the transition

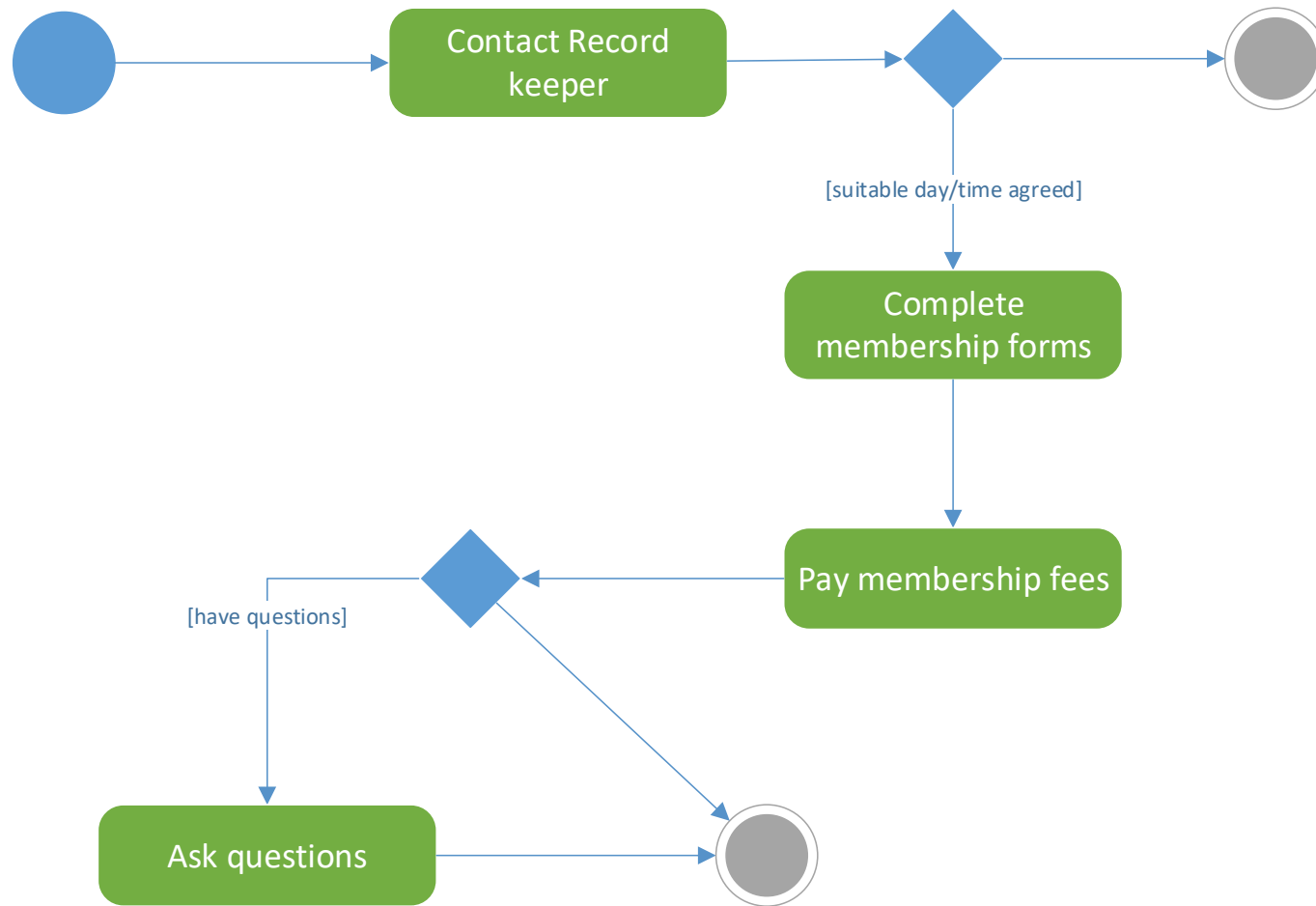
Difference between the merge and join node...



Karate Club: describing the Join Club use case



Activity Diagram: Karate Club - Join Club Use Case



Note: This is incomplete - it has been simplified for illustration purposes

Any Questions?

Further Reading

- Bennett, McRobb and Farmer (most recent edition). Object Oriented Systems Analysis and Design. McGraw Hill
- Cockburn (most recent edition). Writing Effective Use Cases. Addison Wesley
- Schmuller (most recent edition) Teach yourself UML. SAMS