COMP1023 Software Engineering

Spring Semester 2019-2020

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Lecture 5
2020-03-04

Topics covered

System Modelling

A Interaction Models

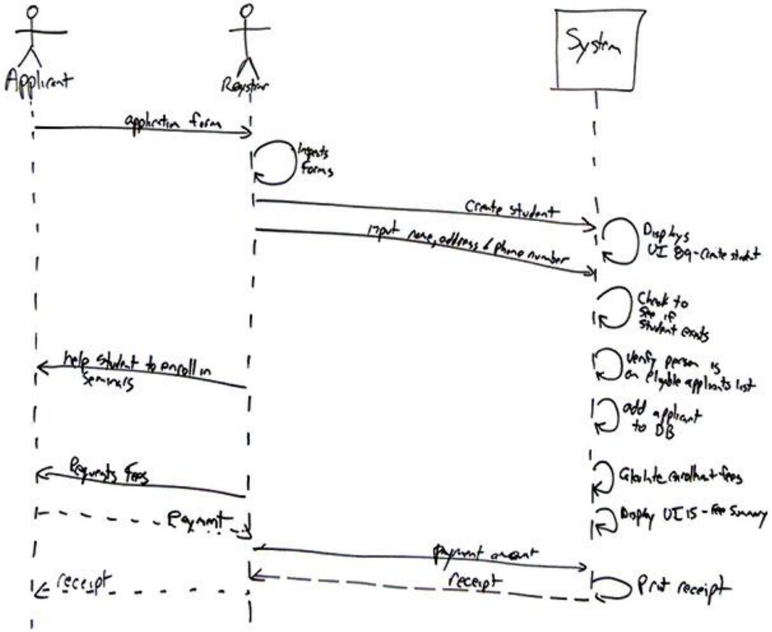
- Use Cases (previous lecture)
- Sequence Diagrams

System Modeling

Loosely based on
Sommerville, Software Engineering, 10th Ed., 2015

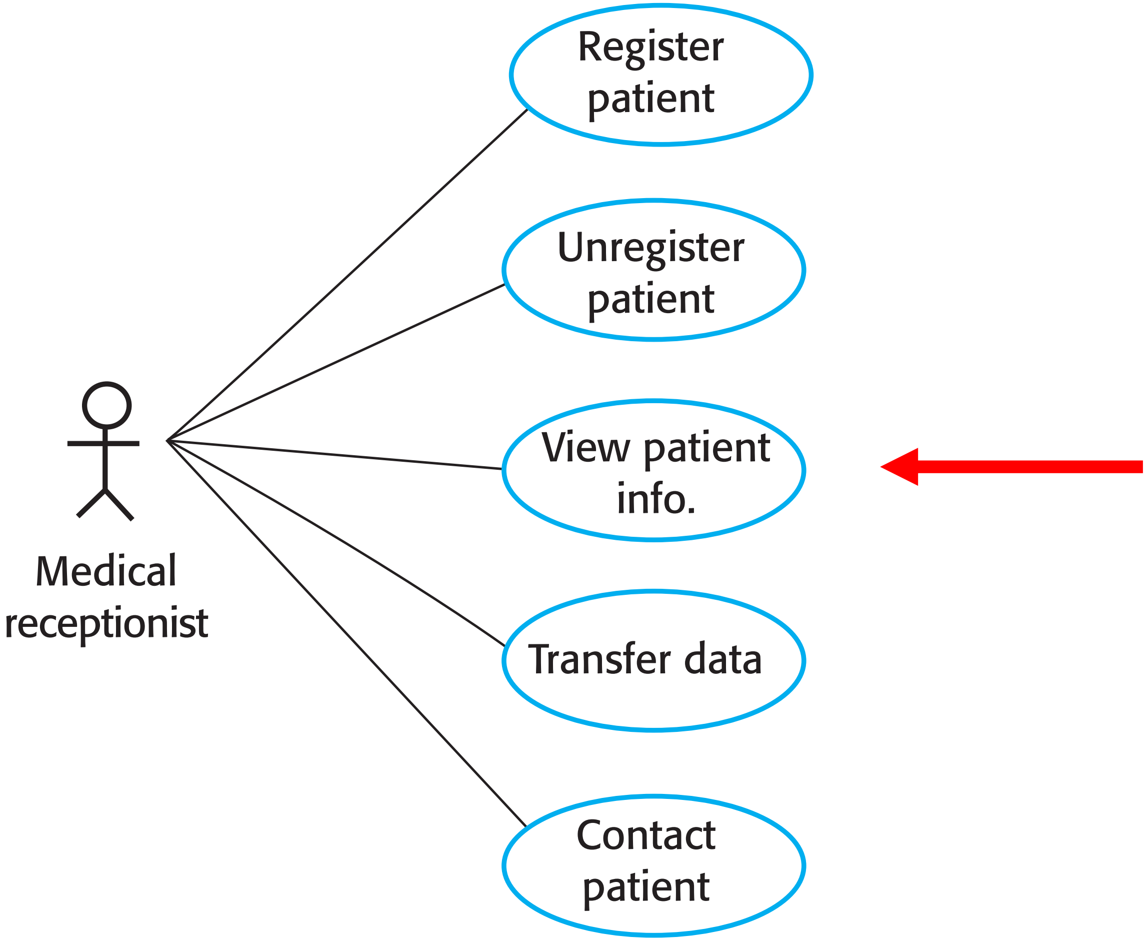
Sequence diagrams

- ✧ Are used to model the interactions between actors and systems, or between the **components** of a system.
- ✧ Show the **sequence of interactions (messages)** that take place during a particular use case.
- ✧ Used for both requirements analysis and system design.

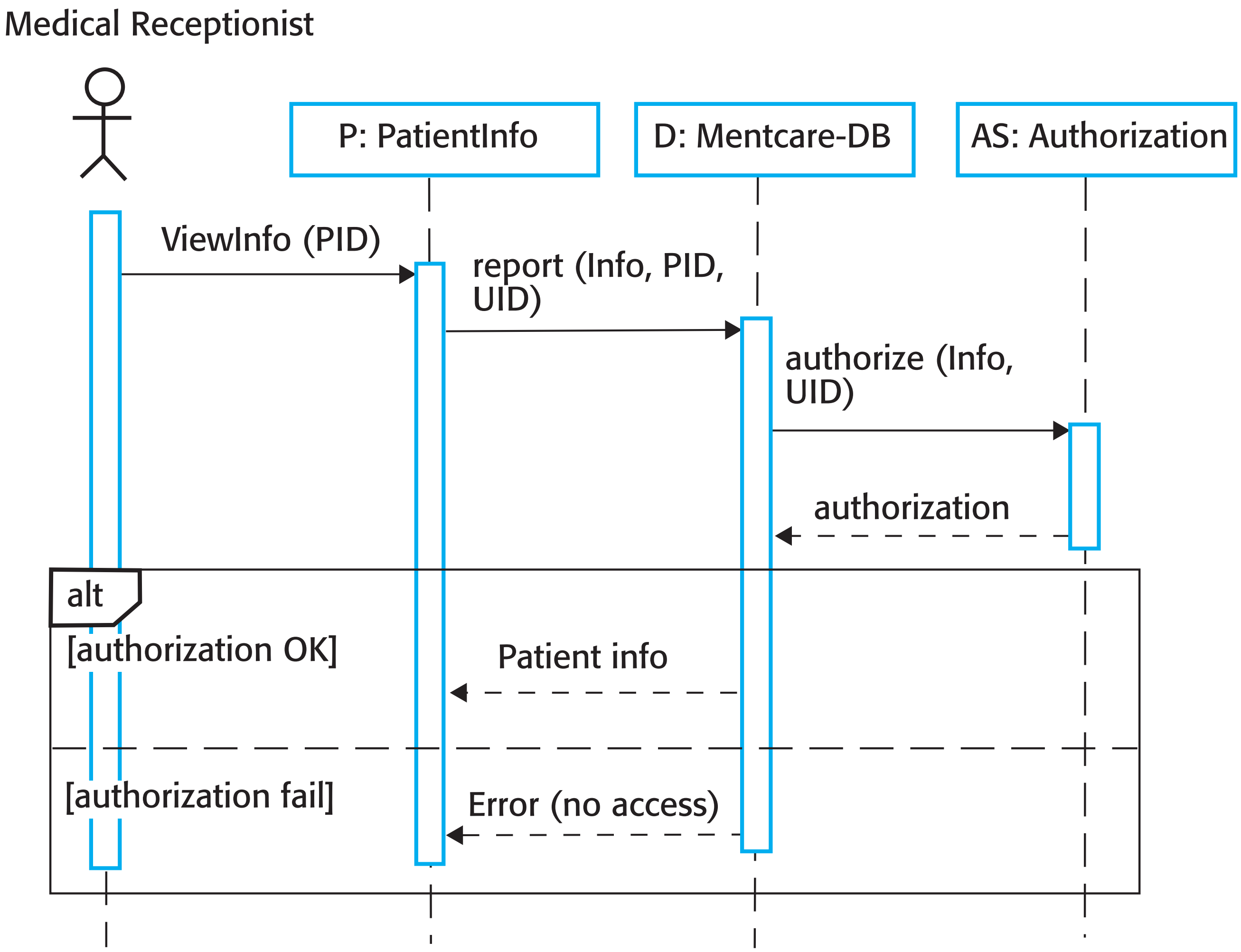


Applicant
Registrar
System
application form
Ingests forms
Create student
input name, address & phone number
Displays UI 89-Create student
Check to see if student exists
Verify person is on eligible applicants list
add applicant to DB
help student to enroll in seminars
Calculate enrollment fees
Display UI 15 - fee Summary
Requests fees
Payment
payment amount
receipt
receipt
Print receipt

Example: Use cases in the Mentcare system involving the role ‘Medical Receptionist’



Example: Sequence diagram for “View patient information”



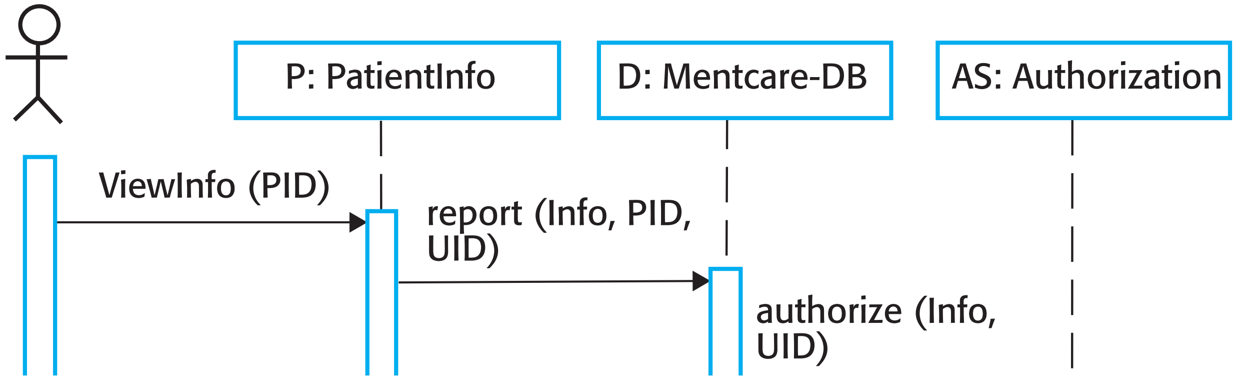
Sequence diagrams: main elements

✧ **Participants** are the entities that interact with each other

- Named rectangles & actor figures along the top edge

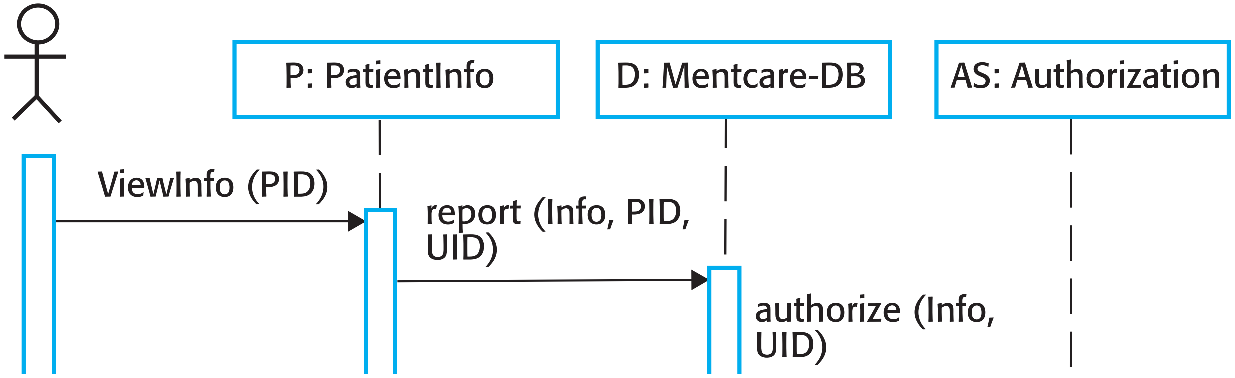
✧ **Lifeline** shows the temporal order of messages

- Dotted vertical lines extending from participants downwards



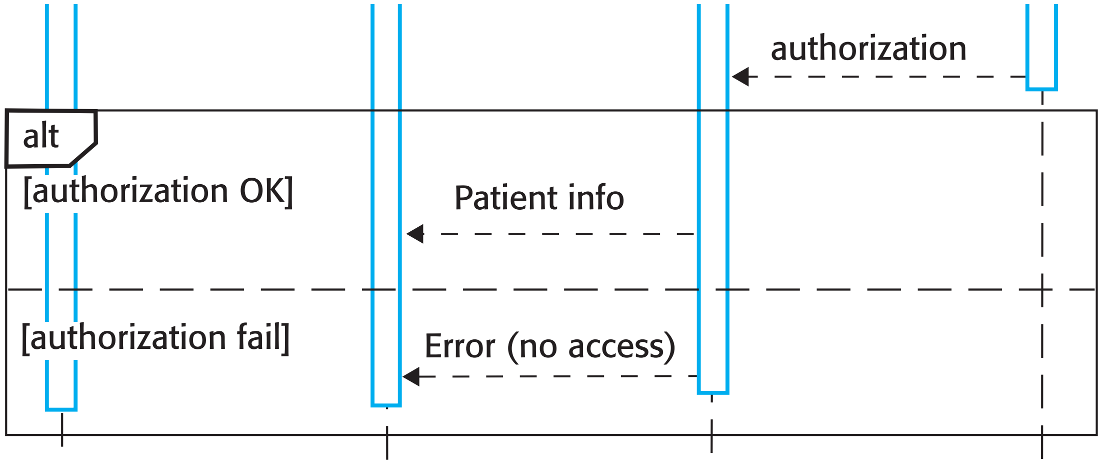
Sequence diagrams: main elements

- ✧ **Messages** show communication
  - Labelled, solid arrows pointing between participants. Dashed arrows show response to previous message.
- ✧ **Execution** shows when participant is actively computing
  - Rectangle overlapping the lifeline



Sequence diagrams: combined fragments

- Example: the **alt** operator to represent an **alternative**



- Other operators:
  - **opt** (option)
  - **loop** (iteration)
  - more: https://www.uml-diagrams.org/sequence-diagrams-combined-fragment.html

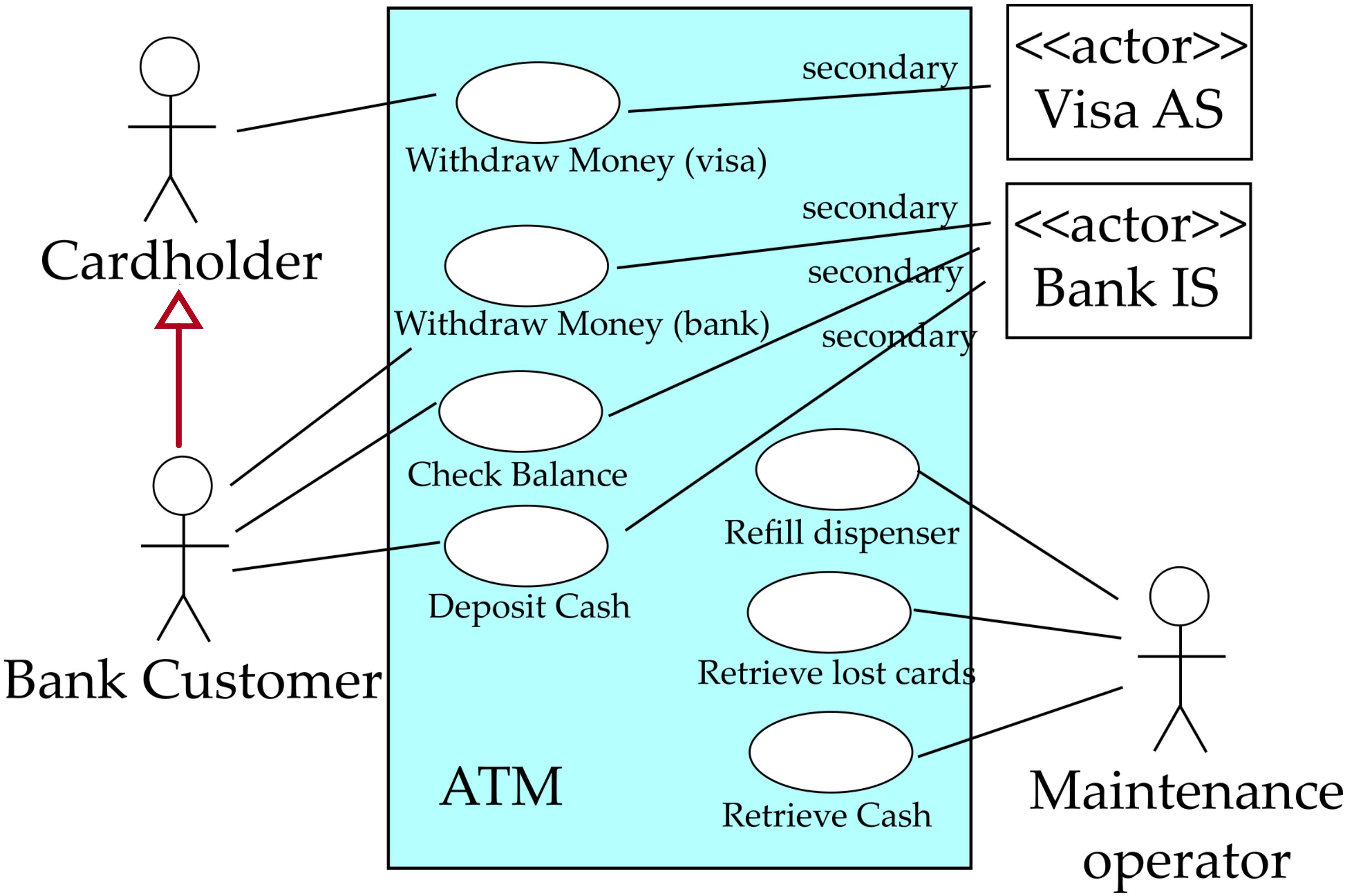
Sequence diagrams: purpose and usage

- **Use case** diagrams show interaction at very abstract level.

- **Sequence diagrams** go into more detail, showing all steps of an interaction (a **sequence**).

- Sequence diagrams were designed with modelling of object-oriented systems in mind, where
  - Participants represent the objects in the system,
  - Messages represent method calls.

Recall the bank ATM example: use case diagram

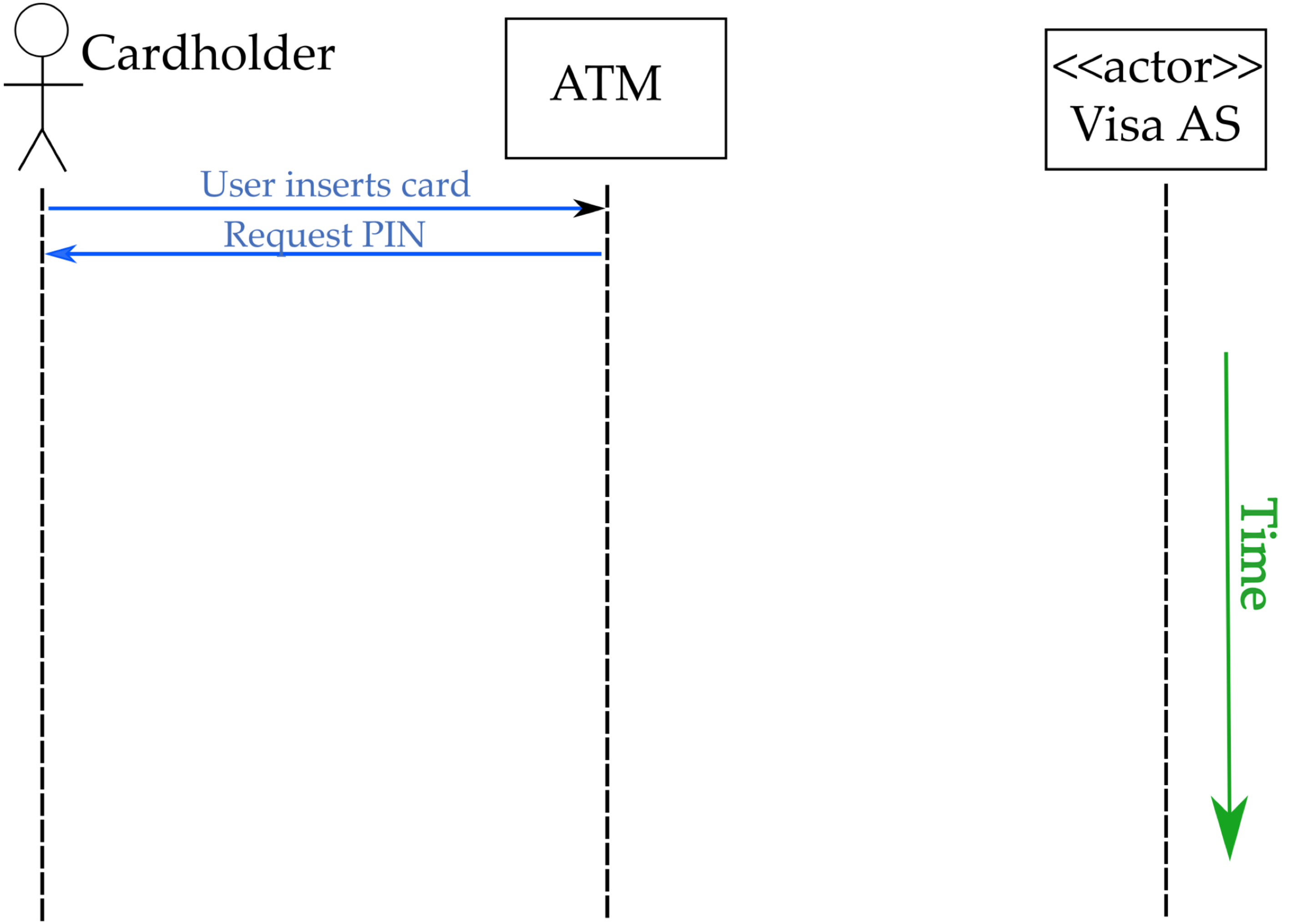


Bank ATM example: use case body

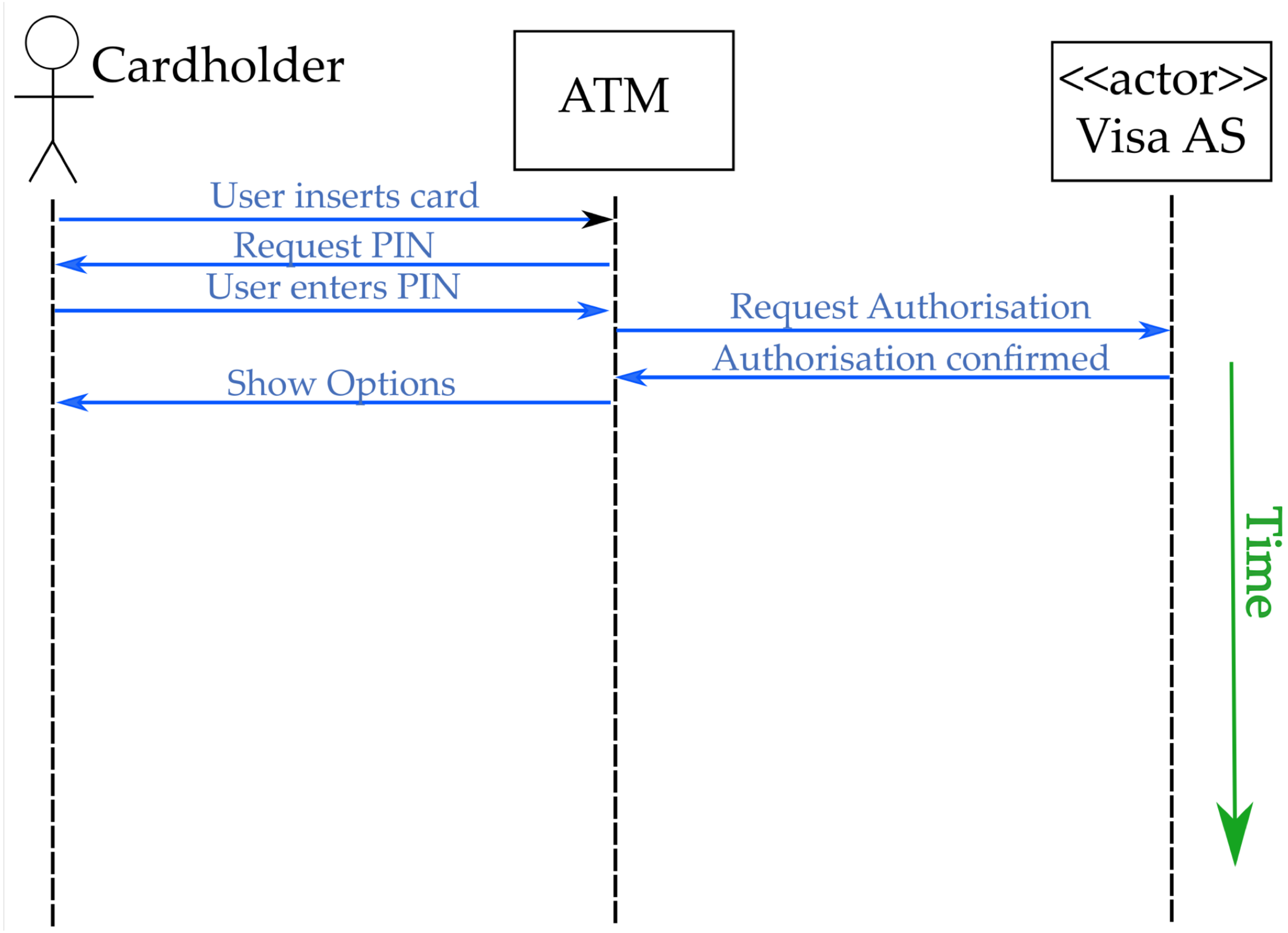
For the use case **Withdraw money (Visa)**: withdraw money using Visa card.
Actors: Cardholder, Visa AS.

1. Cardholder inserts card	2. Request PIN from Cardholder
3. Cardholder enters PIN	4. Request authorisation from Visa AS
5. Visa AS confirms	6. Show options
7. Cardholder selects “withdraw”	8. Ask Cardholder for desired amount
9. Cardholder enters amount	10. Requests limit from Visa AS
11. Visa AS reports limit	12. Checks if amount below limit
	13. Returns card
14. Cardholder takes card	15. Issues banknotes
16. Cardholder takes banknotes	
Actor actions	**System responsibilities**

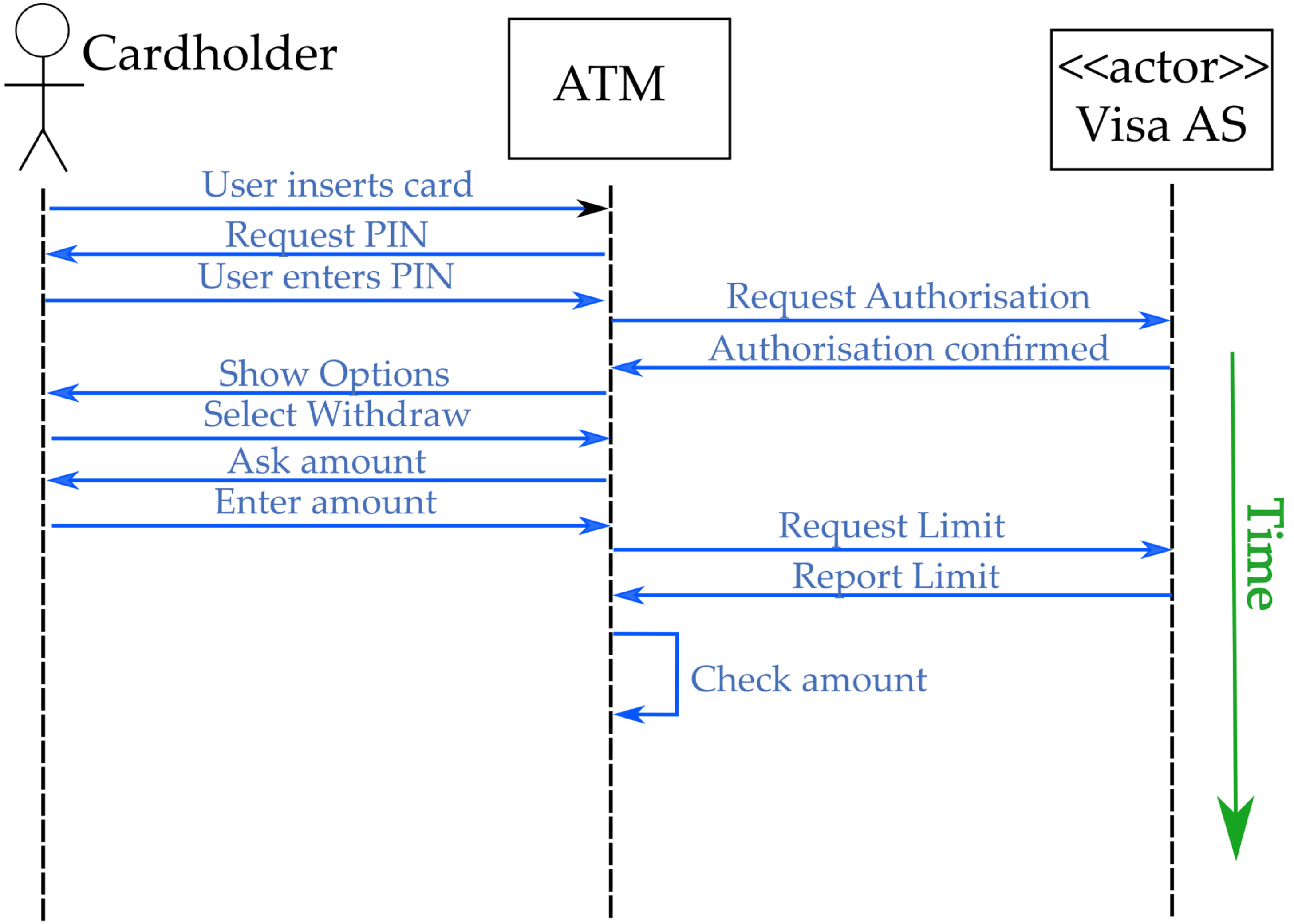
Bank ATM example: sequence diagram



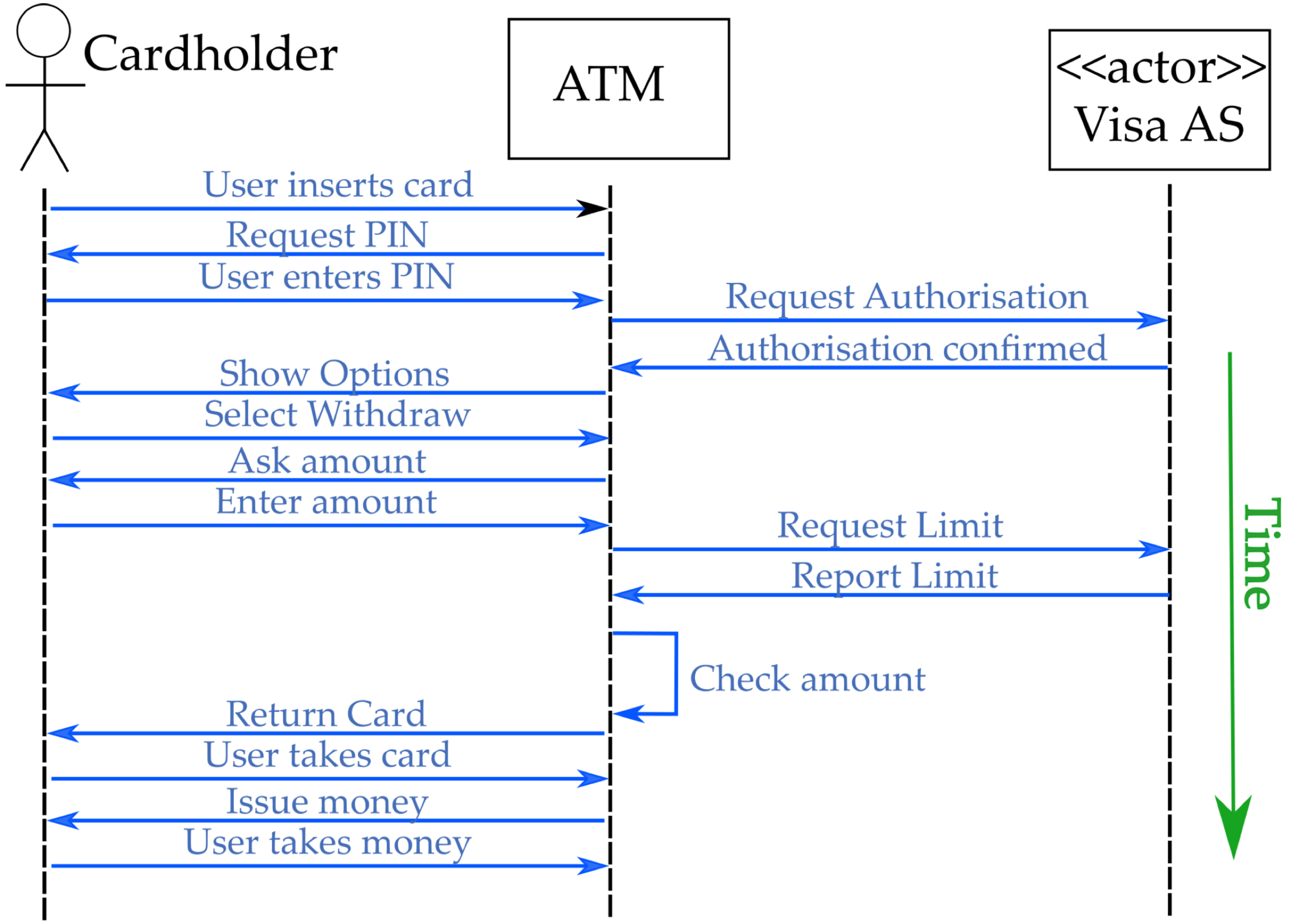
Bank ATM example: sequence diagram



Bank ATM example: sequence diagram



Bank ATM example: sequence diagram



Key points: sequence diagrams

- ✧ Sequence diagrams add more information to use cases by showing the interaction between multiple system components.
- ✧ One diagram represents **one** scenario (but can include exceptions and alternatives using *combined fragments*).
  - ▪ Another way to show alternative/error scenarios is to use an **activity diagram** (next lecture topic).
- ✧ Sequence diagrams are generally useful for understanding **sequential tasks** (e.g. network protocols).

I expect all of you to go to every class because attendance is mandatory!
Also make sure to leave for class 2 hours early to make sure you get parking
Now it's time for me to read you all a PowerPoint that you could have easily accessed online

Please record your attendance in Instatt!