COLLEGE of CHARLESTON

Systems *Engineering: Design and Development*

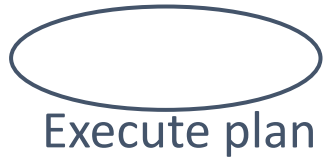
ENGR 387

Agenda

- **Use Cases Basics**
- **System Boundaries**
- **Use Case Diagrams**
- **Default Multiplicities**

Use Case Basics

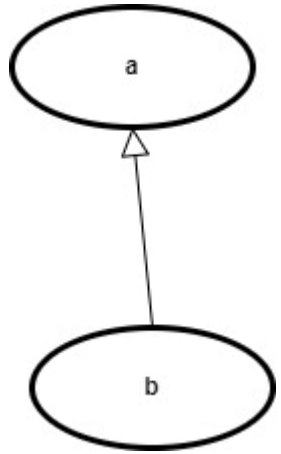
- What does a use case diagram convey?
  - A set of use cases and the actors that invoke and participate in them
  - Invoke (primary); participate (secondary)
- Use Cases
  - Externally visible services a system provides
  - Depicted in an ellipse
  - Usually, a verb phrase
    - Verb phrase can go inside OR beneath ellipse



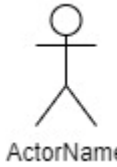
- What does a use case specification convey?
  - The narrative that unfolds when a primary actor invokes the use case

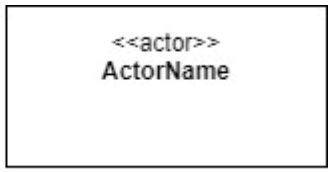
Use Case Basics (cont.)

- What does a use case represent?
  - Actors' goals – goals that actors can achieve by using your system
    - Note: An actor can be depicted as a stick figure OR a rectangle
  - Use cases are written from perspective of the actor (not system)
- What is a use case?
  - It is a classifier, an element of definition
    - So you can use g**eneralizations** b/t use cases AND b/t actors
- What does a generalization convey?
  - The subtype **b** is a type of the supertype **a**



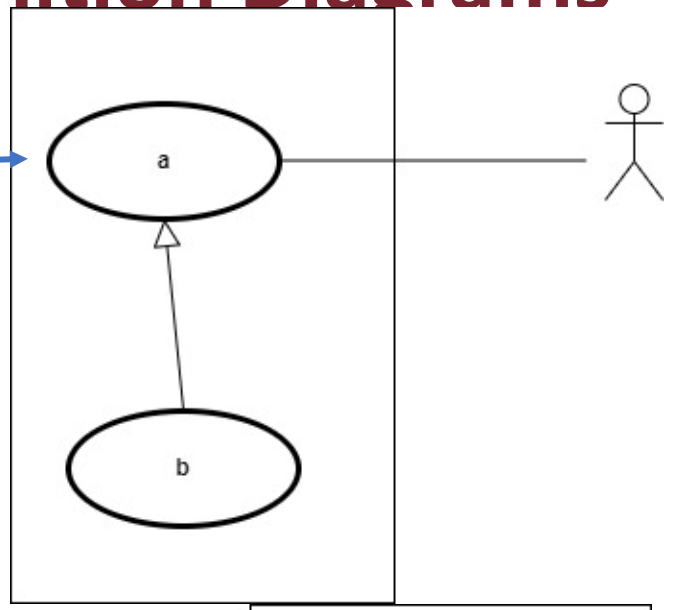
Two depictions of actor



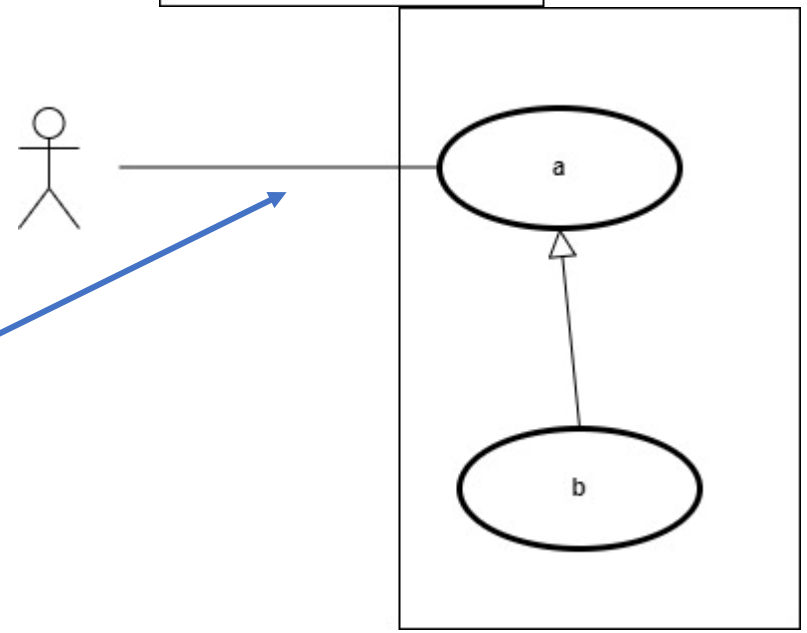


Purpose and Use of Blocks and Block Definition Diagrams (cont)

- System boundary
  - Represents the system that owns and performs the use cases
  - NOT the same as the diagram frame; it is NOT the namespace
  - It may have the same name as the block but IT IS NOT THE BLOCK
  - Everything outside the boundary is an actor
  - Use cases are nested under the model element / namespace



- Reference association
  - Note: You cannot have associations between use cases



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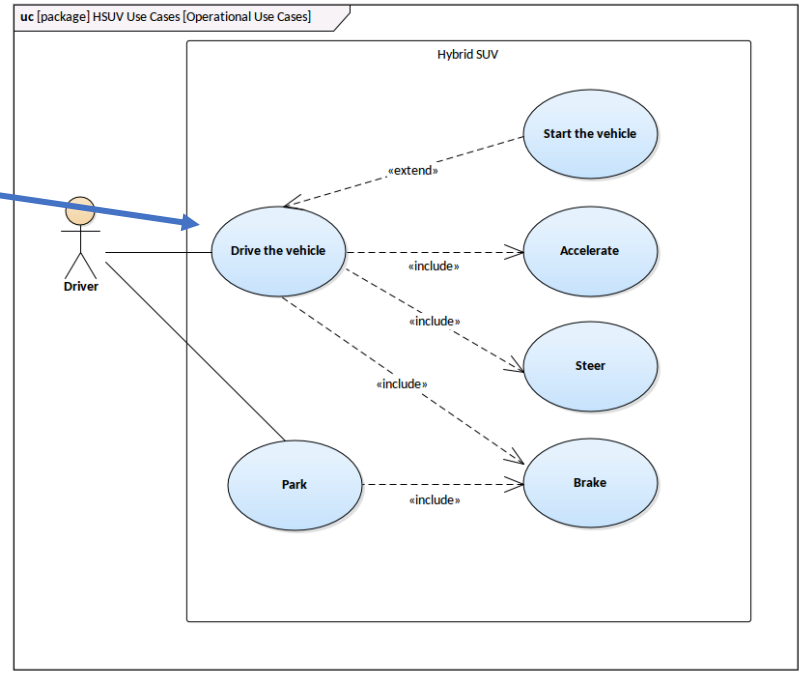
Purpose and Use of Blocks Features

- Base Use Case
  - A use case connected to a primary actor via an association relationship
- Included Use Case
  - Any use case that is at the target (arrowhead) of an <<include>> relationship
  - “When x gets invoked, so does y”
- Extending Use Case
  - Any use case that is at the source (tail) of an <<extend>> relationship
  - “When a gets invoked, b MAY as well”



SysML Use Case - Hybrid SUV Use case | Enterprise Architect Diagrams Gallery (sparxsystems.com)

Questions

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Summary

References

- Additional information can be obtained by reviewing:
  - SysML Distilled (Delligatti)
    - Chapter 5: Use Case Diagrams

Review Questions

Question 1

- Which of these is NOT depicted in a use case diagram?
  A. Externally visible services that a system provides
  B. Actors that participate in use cases
  C. Requirements derived from use cases
  D. System Boundary

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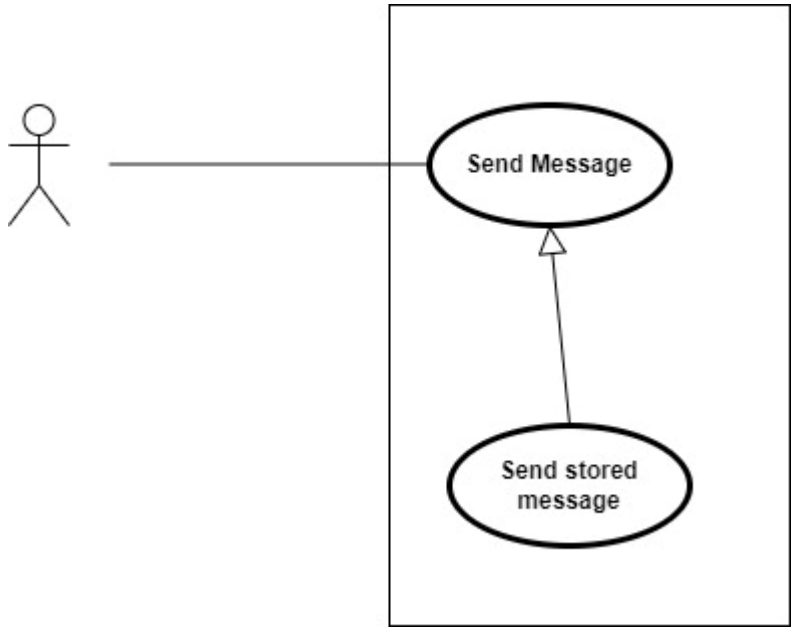
Question 2

Which of these is NOT true regarding this use case diagram excerpt?

A. Send stored message is a type of Send message
B. Any structure that provides the Send stored message service will meet the needs of any client that requires the Send message service
C. The system boundary shown represents the system that owns and performs the two use cases inside it
D. Any structure that requires the Send stored message service must first invoke the Send message service



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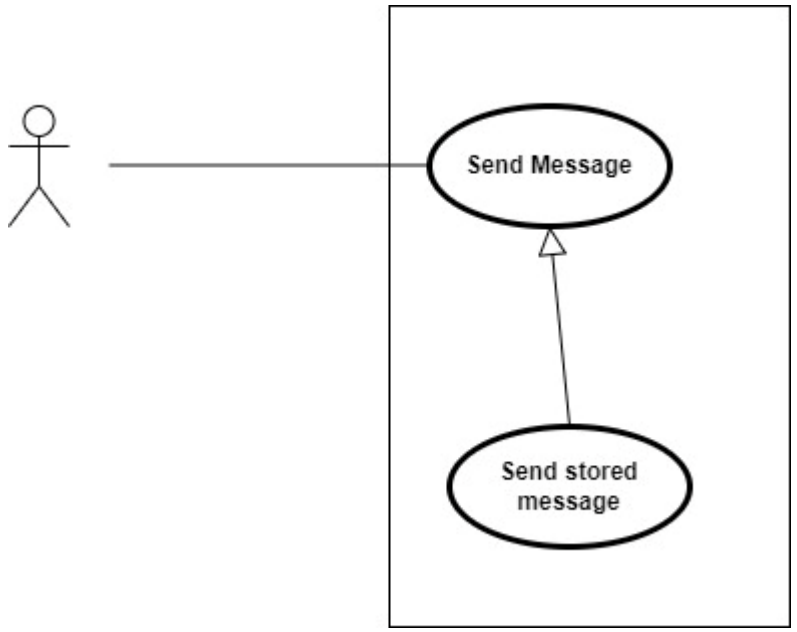
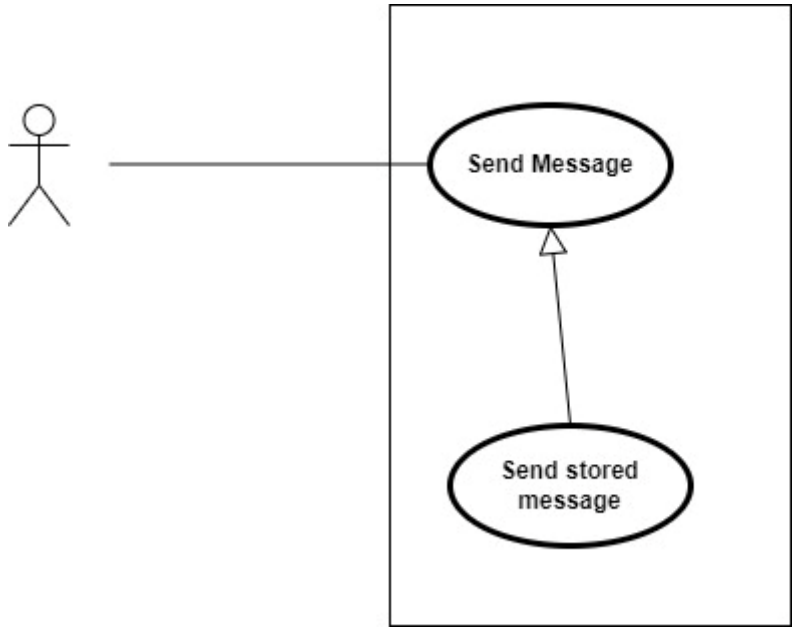


Question 3

What relationship does the line between the actor and the Send message use case represent?

A. Reference Association
B. Link
C. Generalization
D. Dependency Relationship
E. Include Relationship



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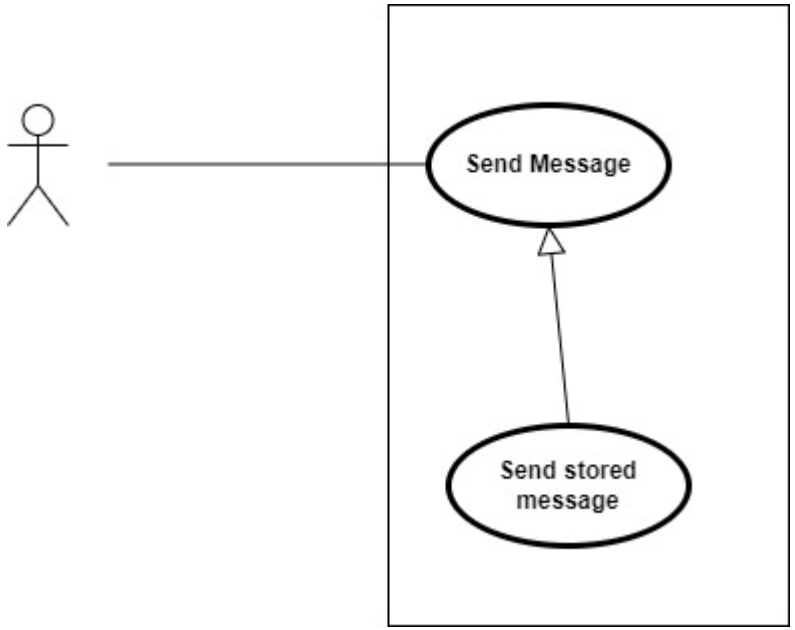
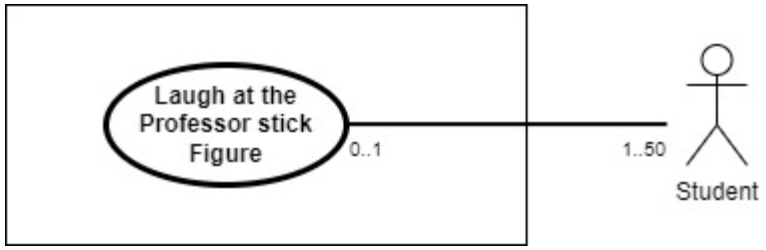


Question 4

Which of the following statements is NOT true about the following use case diagram excerpt?

A. Any particular student may be involved in zero or one execution of Laugh at the Professor stick figure at any given moment
B. At least one student must be laughing at the Professor stick figure at all times
C. A single execution of Laugh at the Professor stick figure use case can involve anywhere from 1 to 50 students
D. Laugh at the Professor stick figure is a base use case



Question 4

Which of the following statements is NOT true about the following use case diagram excerpt?

A. Any particular student may be involved in zero or one execution of Laugh at Paul's stick figure at any given moment

B. At least one student must be laughing at Paul's stick figure at all times

C. A single execution of Laugh at Paul's stick figure use case can involve anywhere from 1 to 50 students

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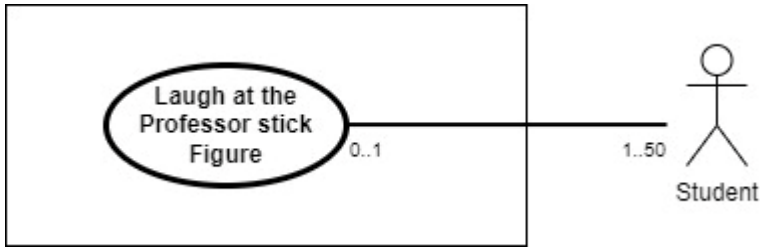
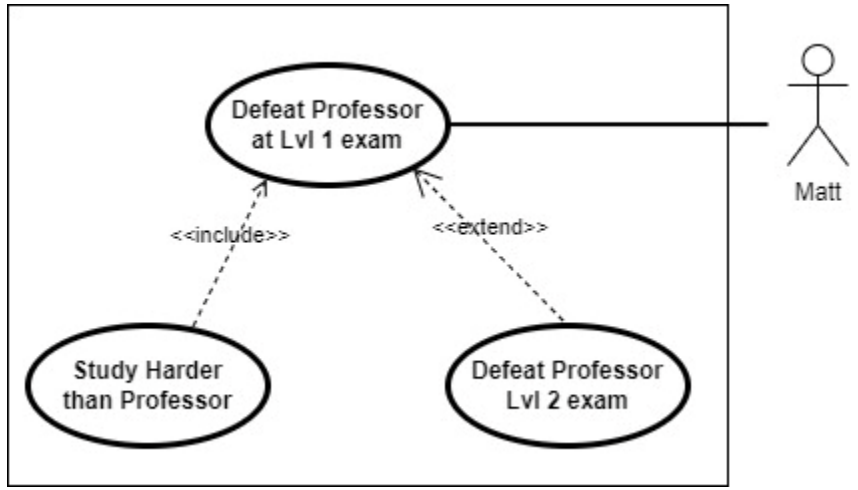


Question 5

Which of the following statements is NOT true about the following use case diagram excerpt?

A. If Matt defeats Professor at the Level 1 exam, then he may also defeat her at the Level 2 exam
B. If Matt defeated Professor at the Level 1 exam, then he also studied harder than he did
C. If Matt defeated Professor at the Level 1 exam, then he may or may not have studied harder than he did
D. Matt is an actor



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Which of the following statements is NOT true about the following use case diagram excerpt?

A. If Matt defeats Carel at the Level 1 exam, then he may also defeat her at the Level 2 exam

B. If Matt defeated Carel at the Level 1 exam, then he also studied harder than she did

C. If Matt defeated Carel at the Level 1 exam, then he may or may not have studied harder than she did

D. Matt is an actor