Week 9

Database Systems -

Introduction to Databases and Data Warehouses

CHAPTER 2 - Database Requirements and ER Modeling (Part 5)

MAIN TOPIC

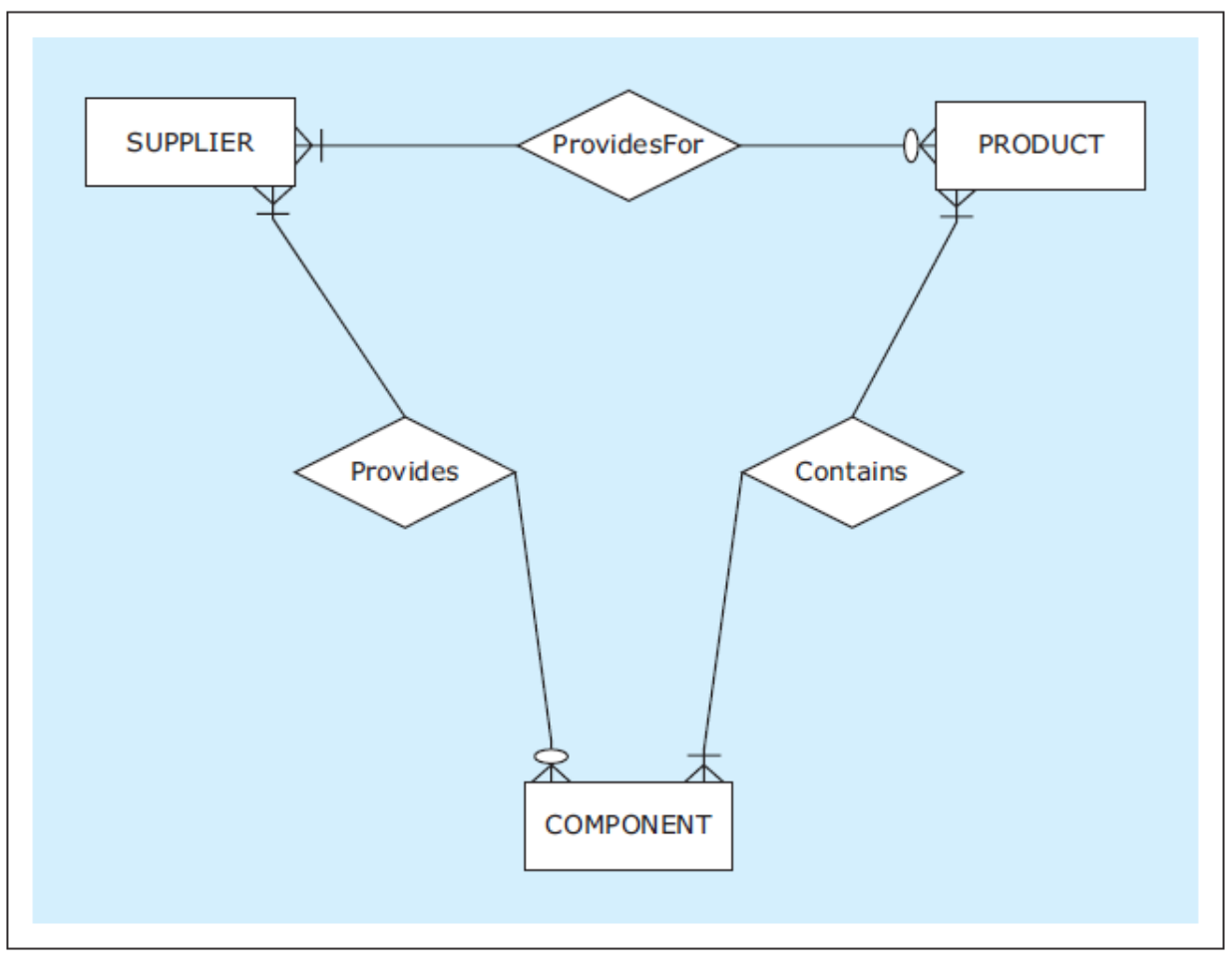
- Ternary Relationship

TERNARY RELATIONSHIP

- Ternary relationship
  - Relationship involving three entities *(degree 3 relationship)*
  - Example: given requirements for a manufacturing company
    - Have multiple products
    - Have multiple suppliers
    - Have multiple components
    - Keep track of which suppliers provide which components for which product
    - Every product contains one or more components, each of which is provided by one or more suppliers
    - Every supplier can provide many components for many products, but do not have to provide any component for any product
    - Every component is provided for one or many products by one or many suppliers

TERNARY RELATIONSHIP

Three binary relationships that are insufficient for depicting given requirements



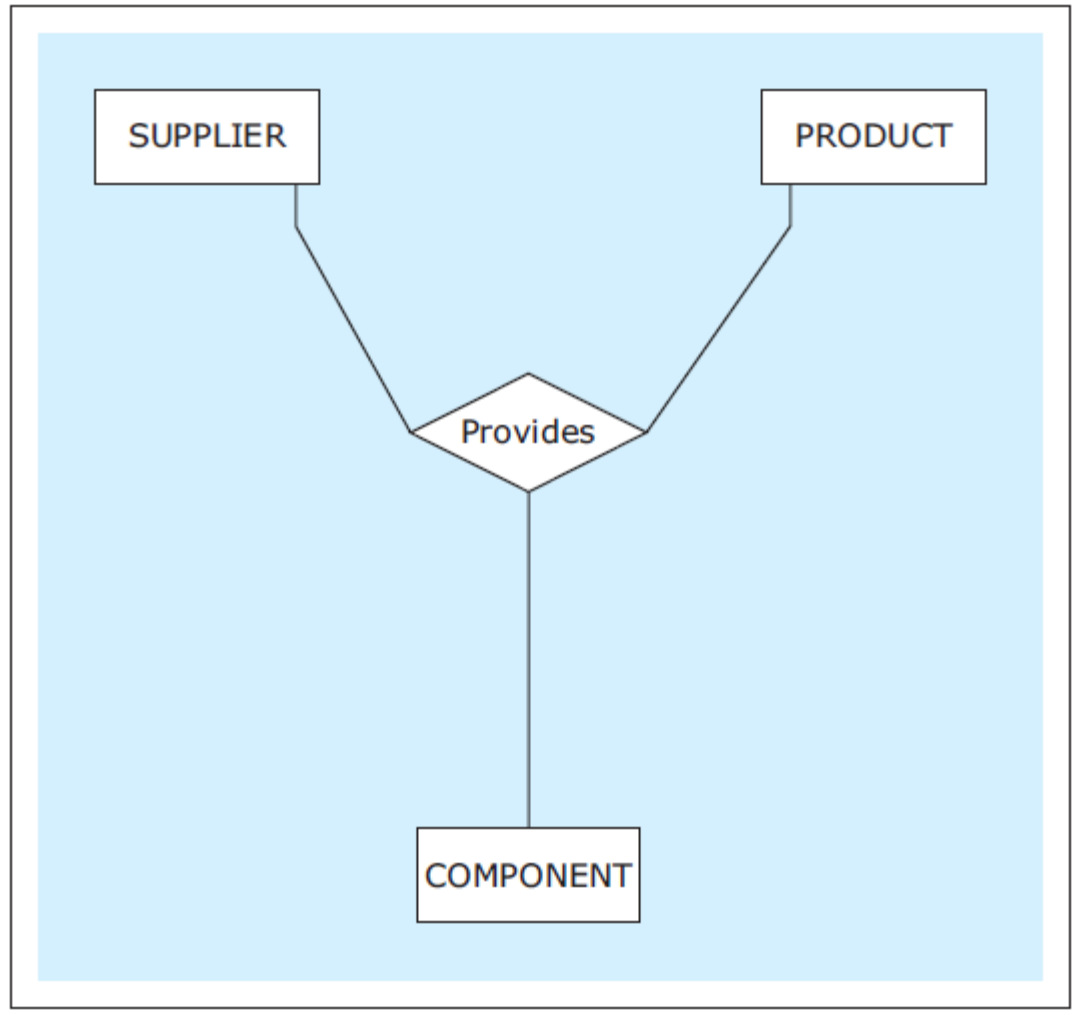
TERNARY RELATIONSHIP

- **Ternary relationship (cont'd)**
  - Can previous ER diagram indicate the scenario below?
    - Supplier S1, S2 provide Component C1
    - Component C1 is in Product P1
    - S1 provide C1 to P1
    - S2 does not provide C1 to P1

TERNARY RELATIONSHIP

A ternary relationship

- Simultaneous involvement among instances of three entities
  - SUPPLIER, PRODUCT, COMPONENT



TERNARY RELATIONSHIP

- Ternary relationship (cont'd)
  - Not possible to unambiguously show cardinality constraints in ternary relationships

    E.g. for the figure in previous slide
    - If put optional symbol on the Component side of the relationship
      - Keep track of suppliers that do not provide any components for products
      - Or keep track of products for which no components are provided by any suppliers?

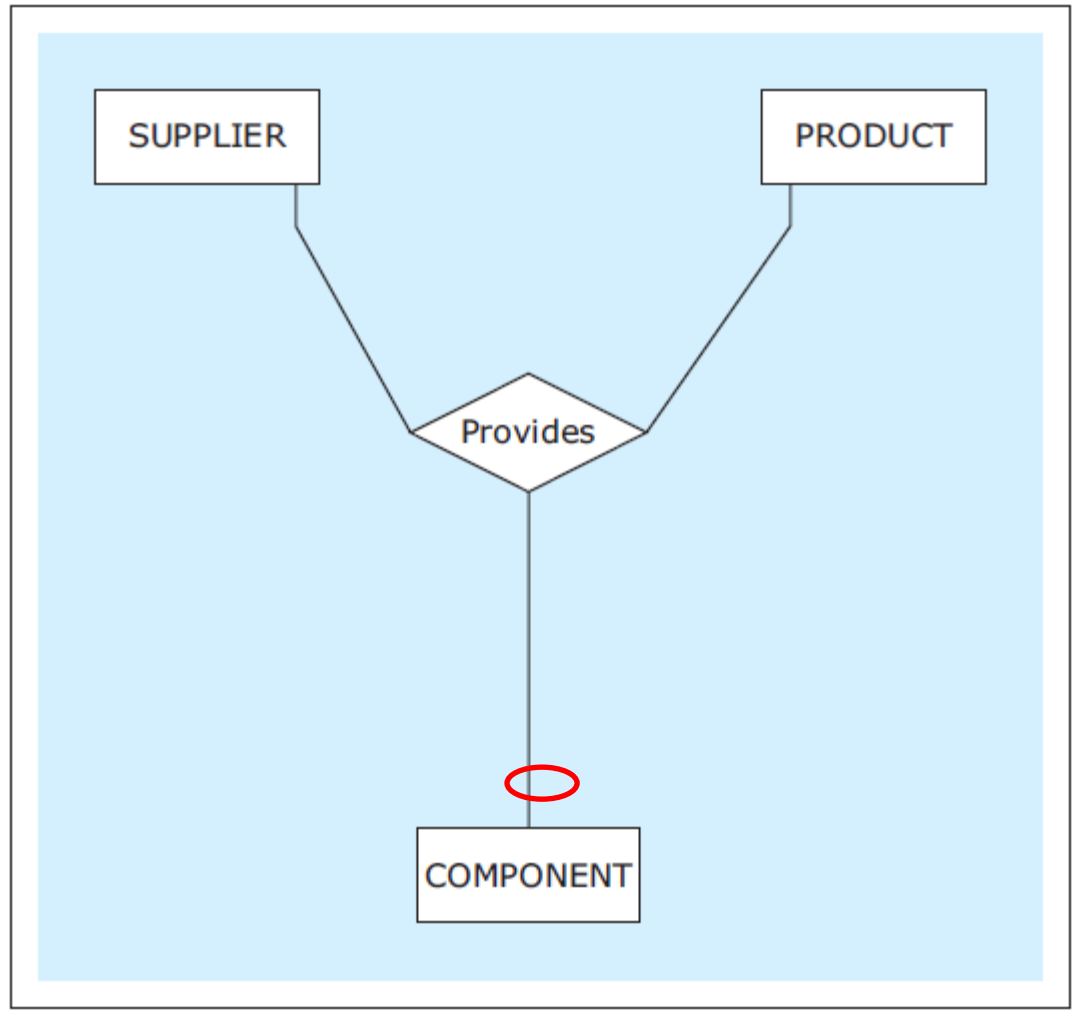
TERNARY RELATIONSHIP

A ternary relationship

If put optional symbol on the Component side of the relationship

Then,

Is it for SUPPLIER or PRODUCT?

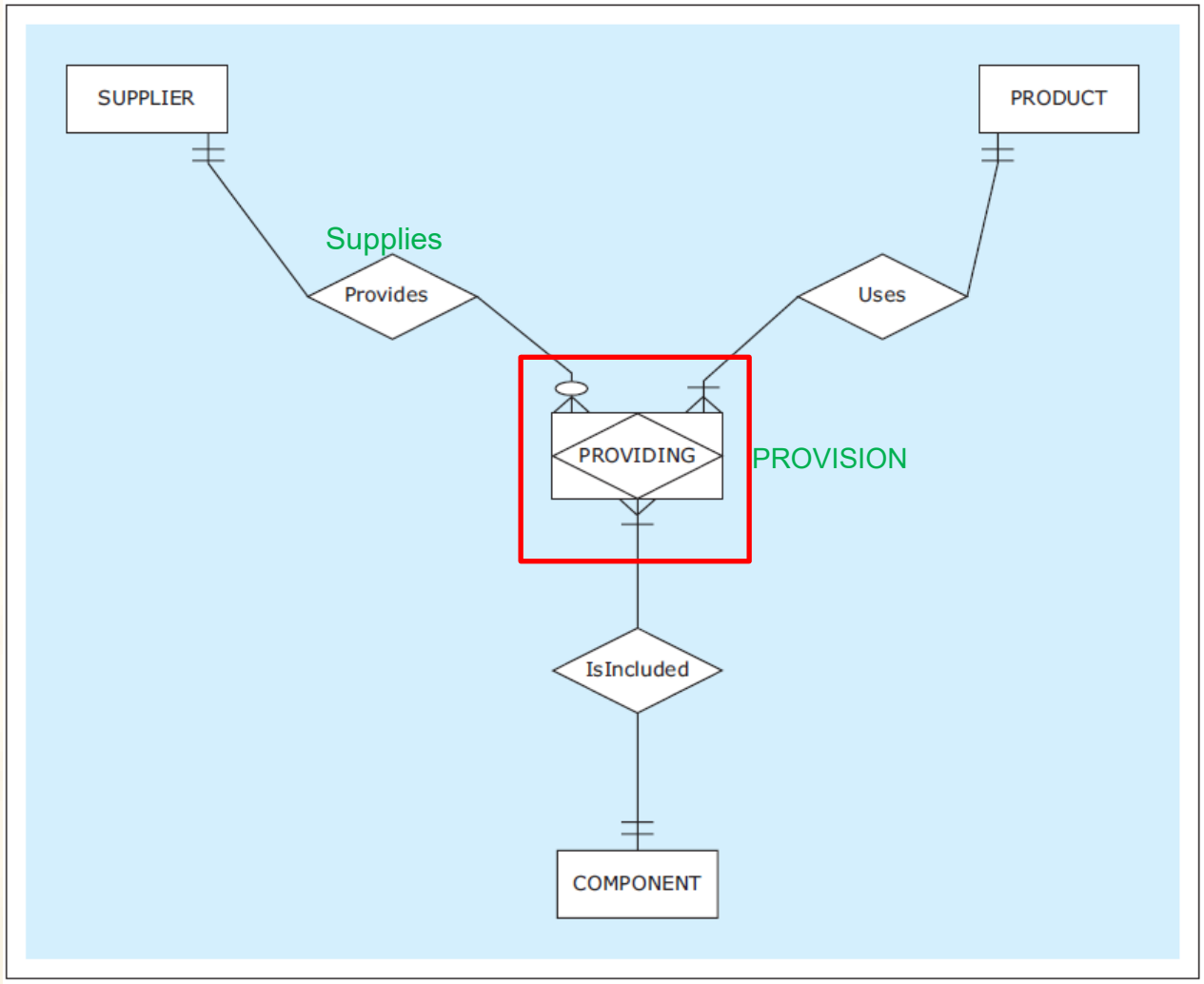


TERNARY RELATIONSHIP

A ternary relationship via associative entity: no ambiguity

An Instance of PROVISION / PROVIDING

- Supplier S1 provides component C1 for product P1



TERNARY RELATIONSHIP

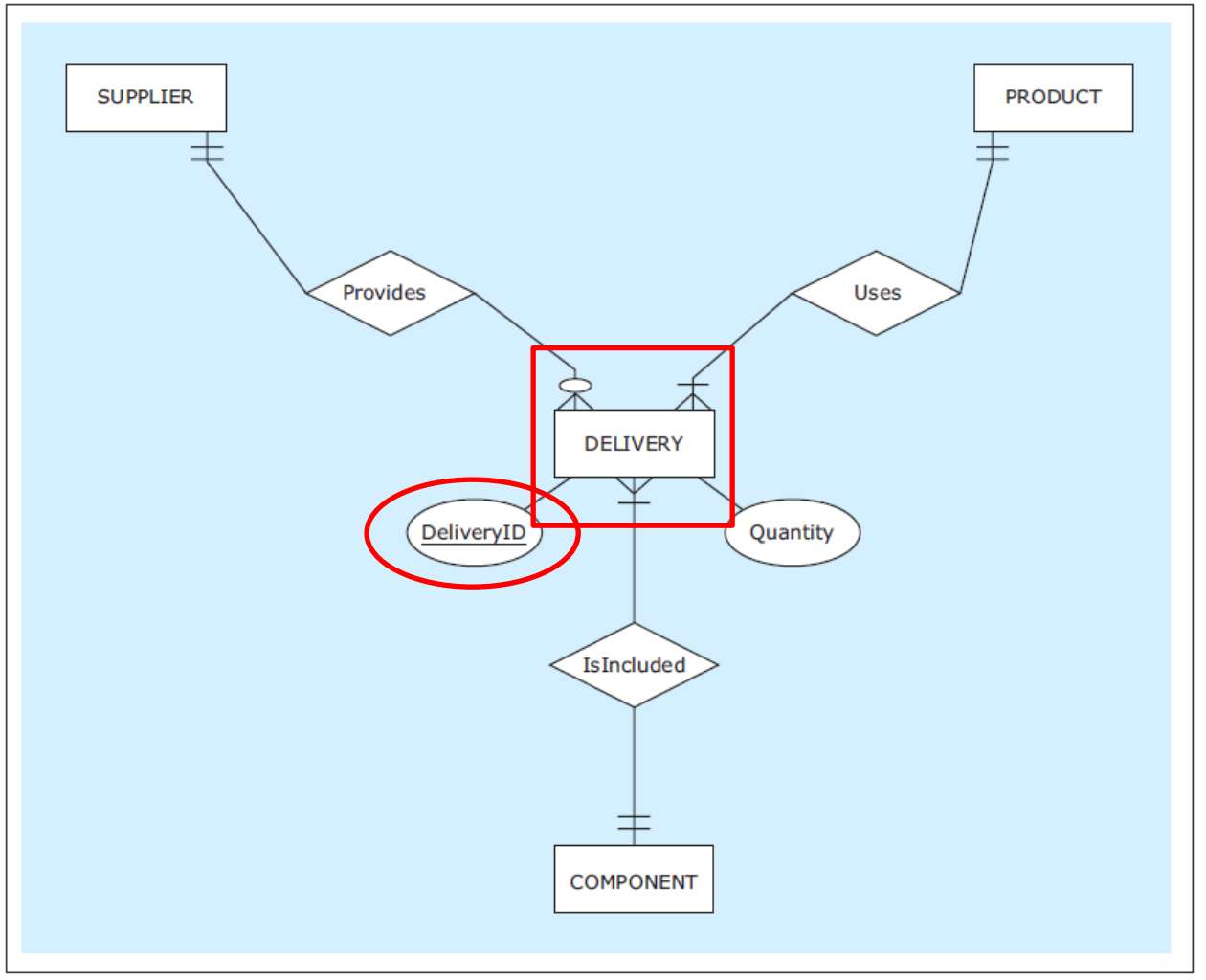
- Ternary relationship (cont'd)
  - What if add quantity to associative entity PROVIDING?
    - Same supplier provide same qualities of same component for same product on different occasions?
      - S1,C1,P1, 100
      - S1,C1,P1, 200
  - Need to add additional requirement: unique delivery ID
    - Use a regular entity with unique ID to replace a ternary relationship

TERNARY RELATIONSHIP

A regular entity replacing a ternary relationship

Deliery1,
S1,C1,P1, 100

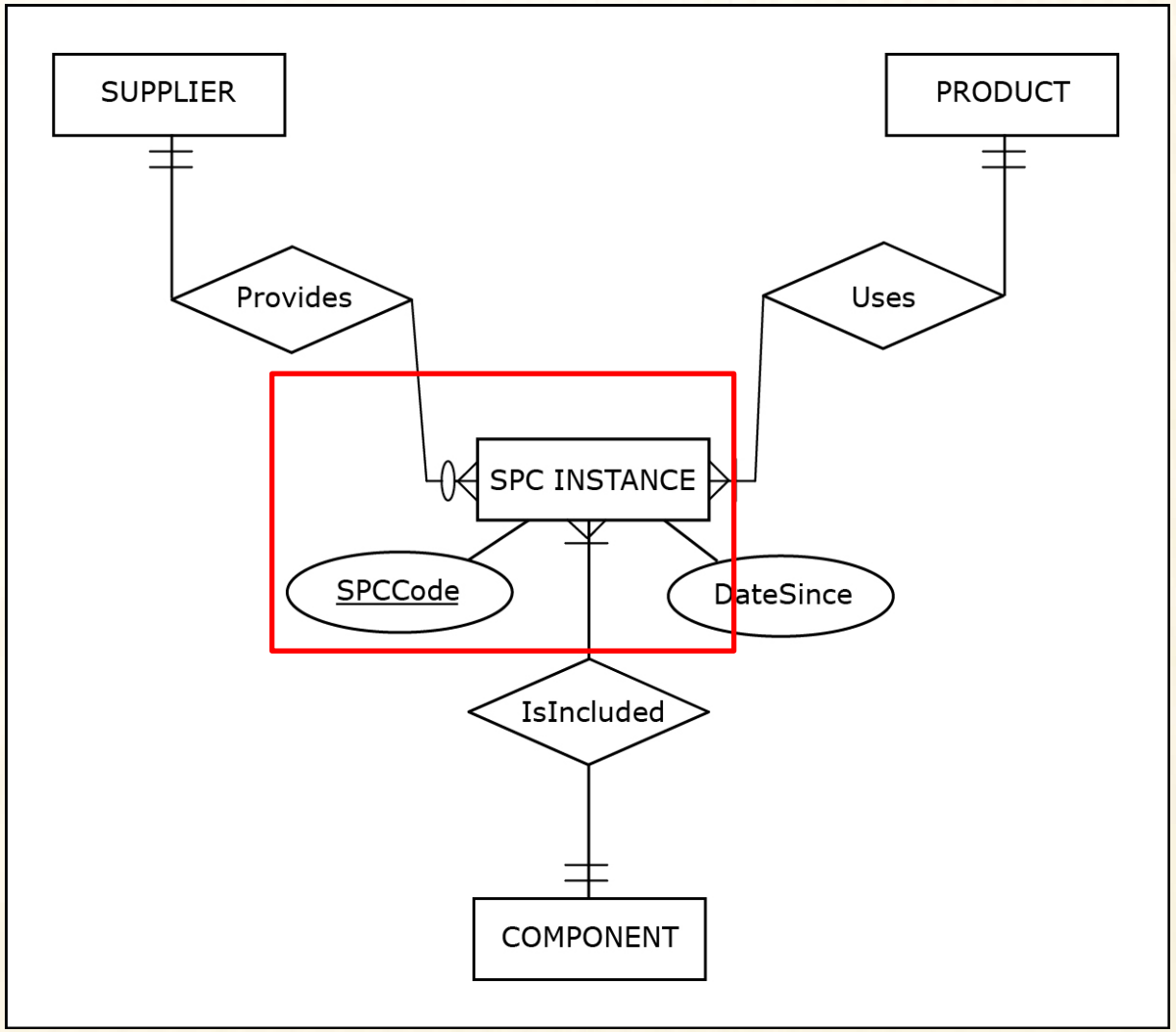
Delivery2,
S1,C1,P1, 200



TERNARY RELATIONSHIP

A regular entity replacing a ternary relationship

(Textbook Edition 2)



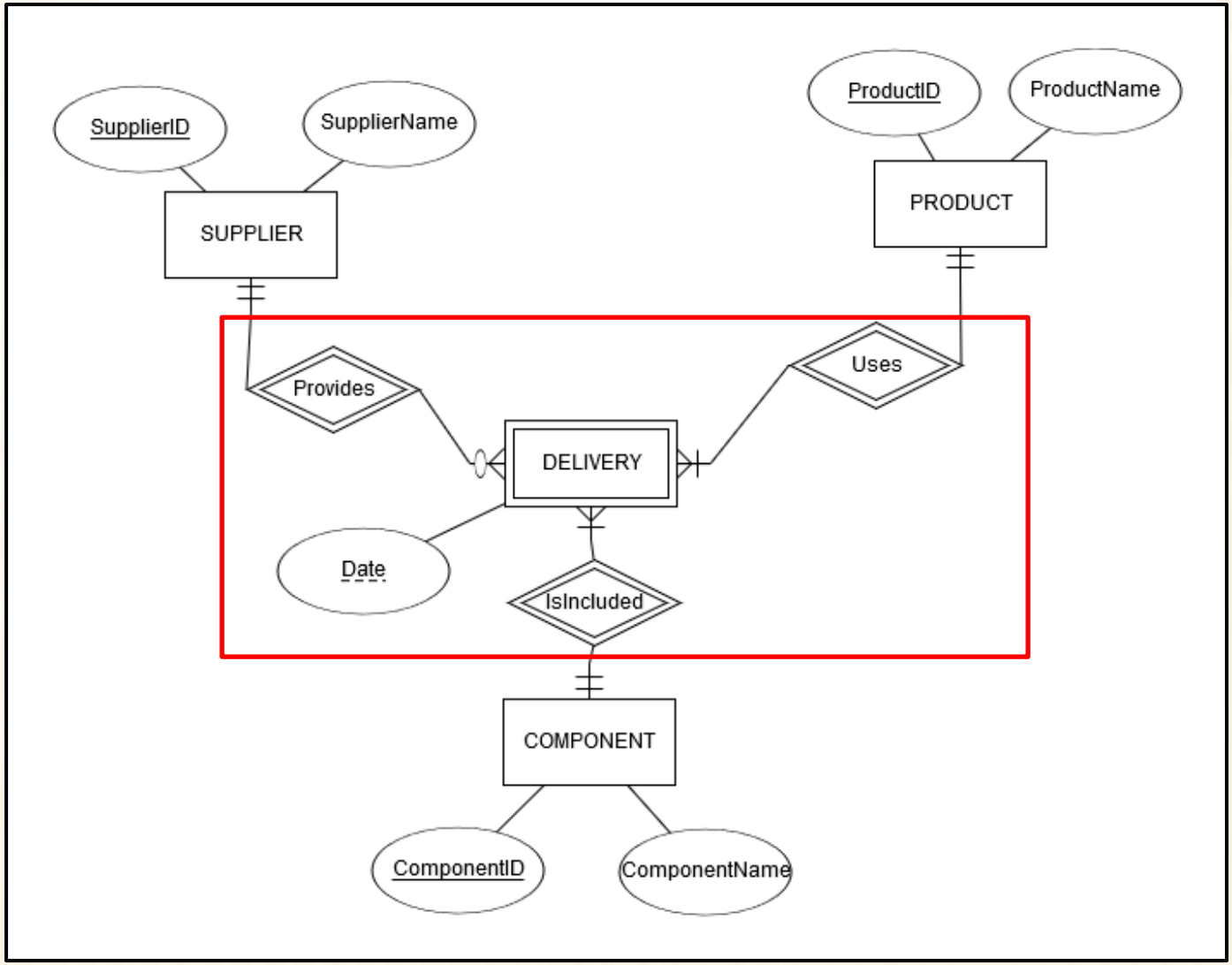
TERNARY RELATIONSHIP

A weak entity replacing a ternary relationship

10/29/2019,
S1,C1,P1, 100

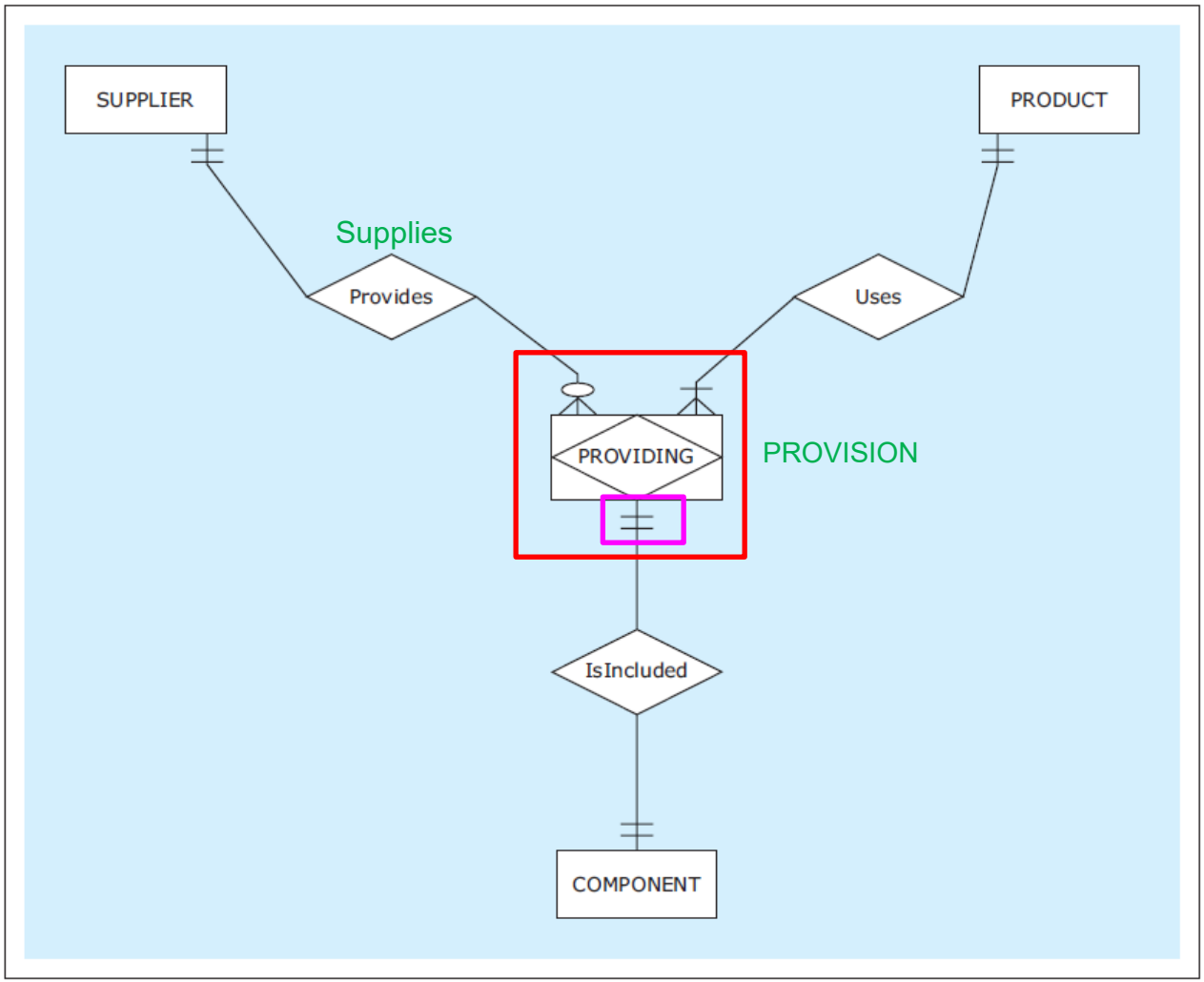
10/30/2020,
S1,C1,P1, 200

Add:
Each supplier delivers a component for a product only once per day.



TERNARY RELATIONSHIP
- many-many-to-one (rare)

Each component is exclusively supplied by only one supplier for only one product.



TERNARY RELATIONSHIP

A many-to-many-to-one ternary relationship eliminated

- Using two binary relationships (Better)