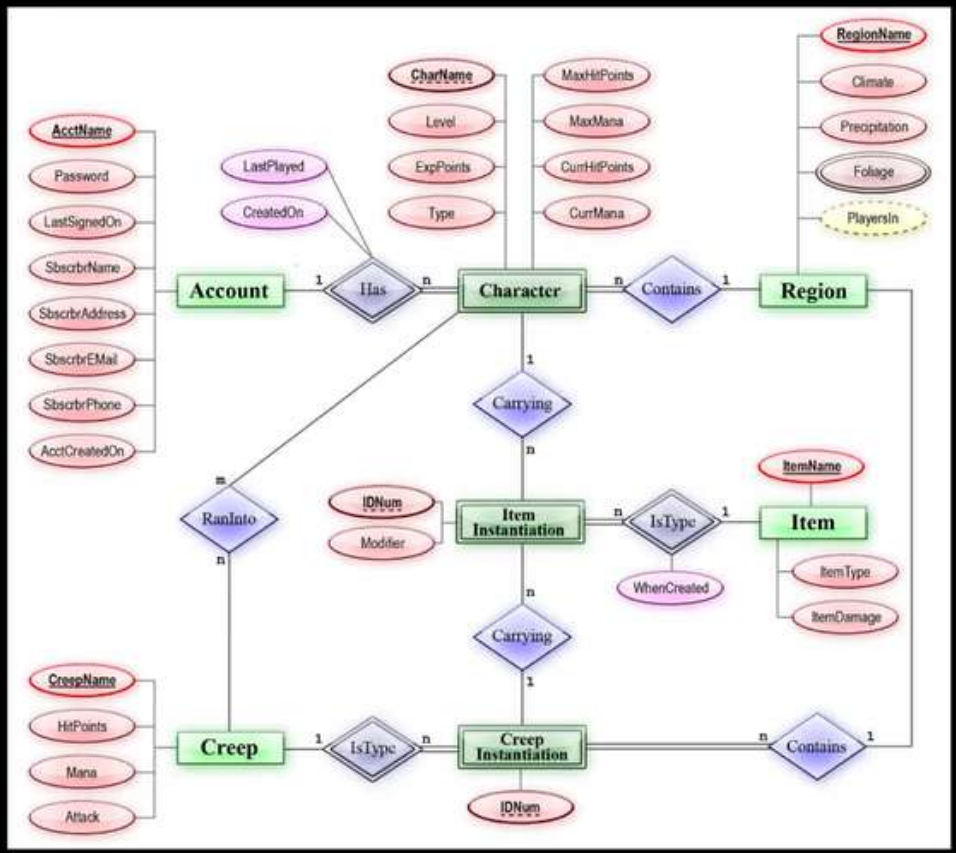
Entity-Relationship model

- ER-models

Purpose: high level picture of the Database

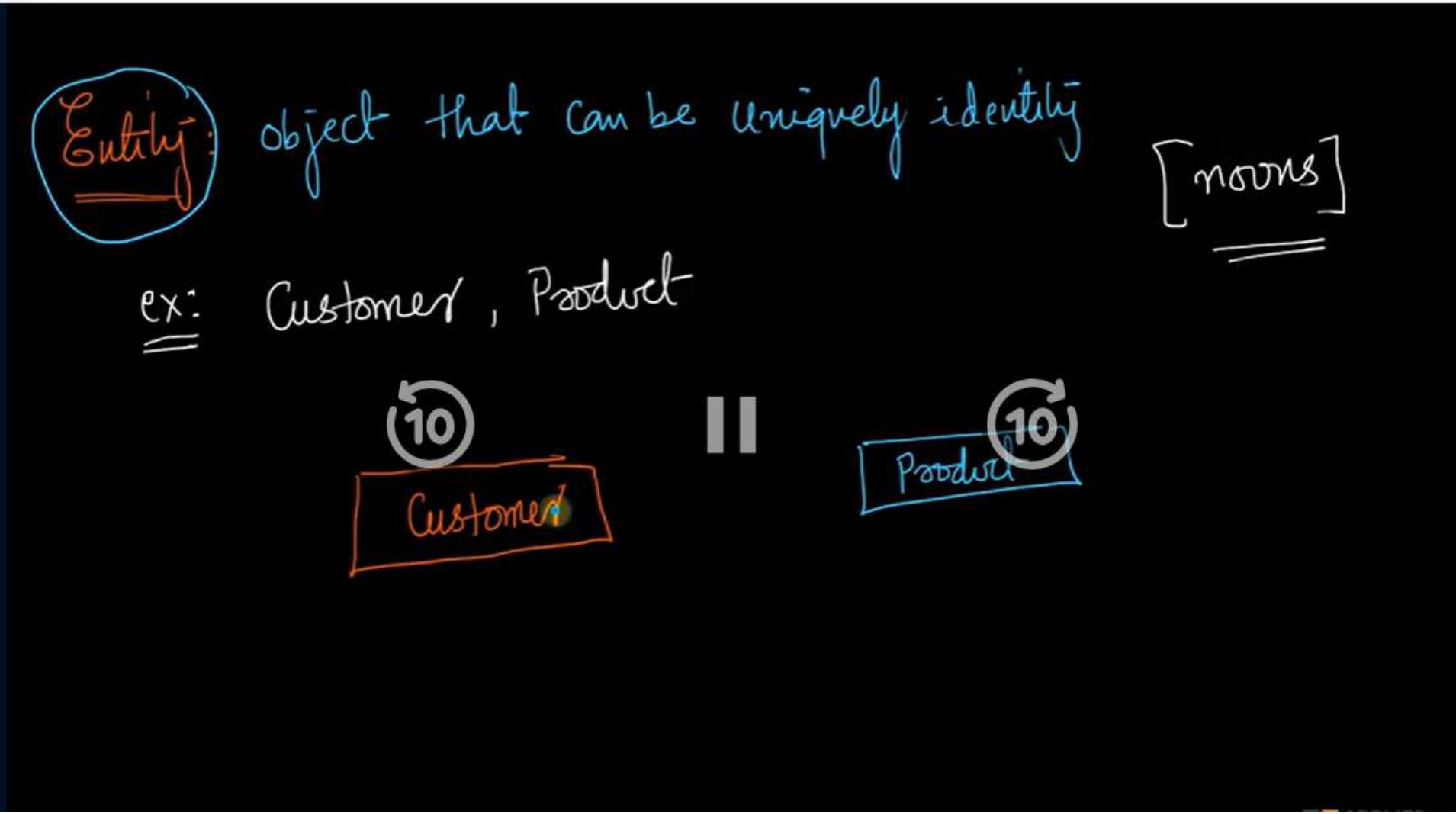
Various teams

- Tables
- Keys
- Integrity Constr



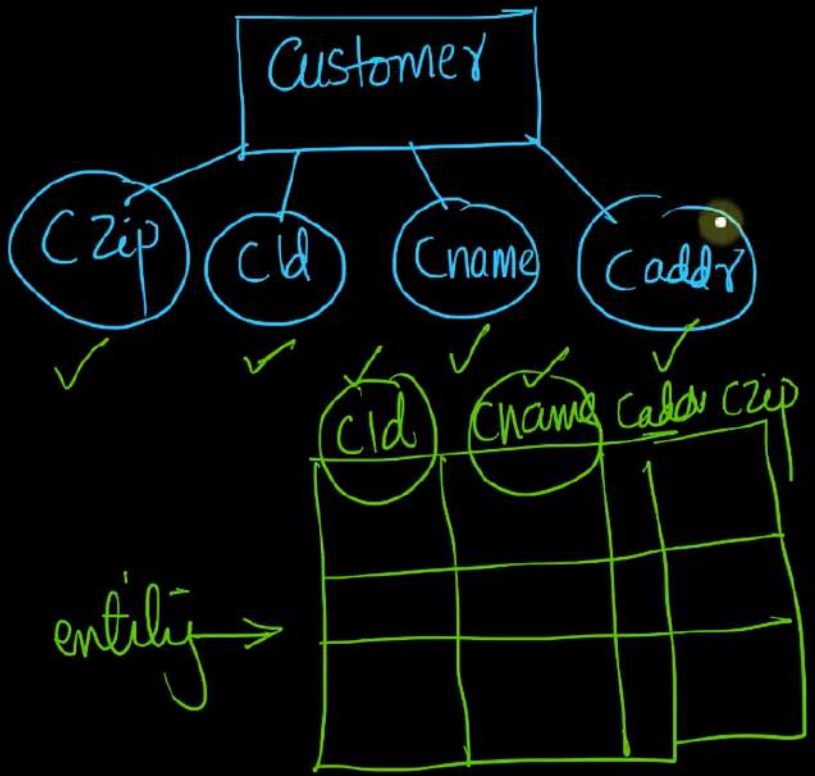
ER diagram (wiki)

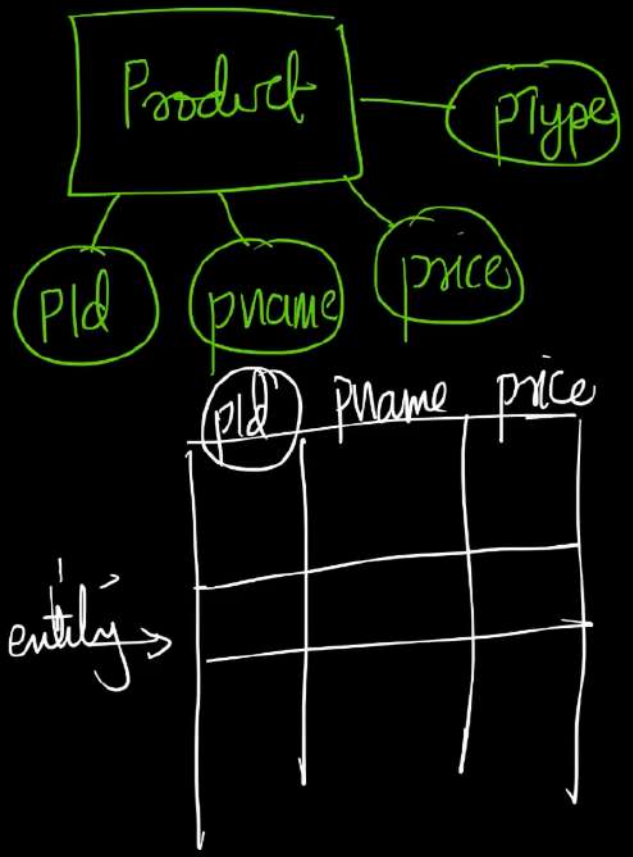
APPLIED COURSE


Entity: object that can be uniquely identify
[nouns]
ex: Customer, Product
10
Customer
Product
10

Attributes: properties / features of an entity / relationships

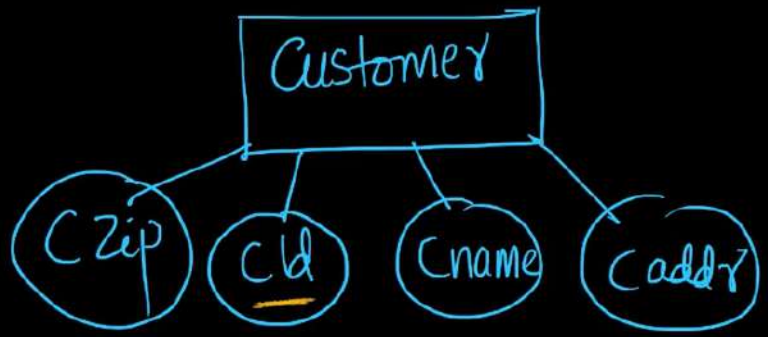
→ Columns

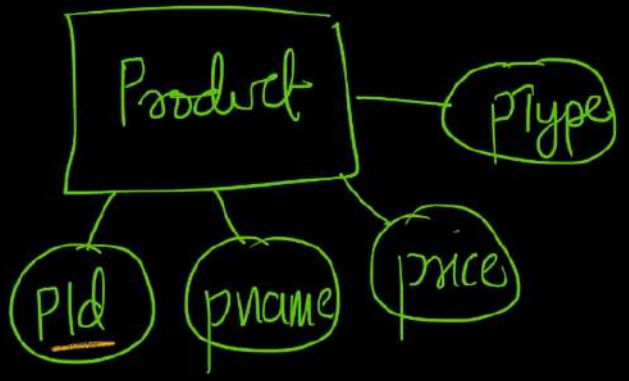




APPLIED COURSE

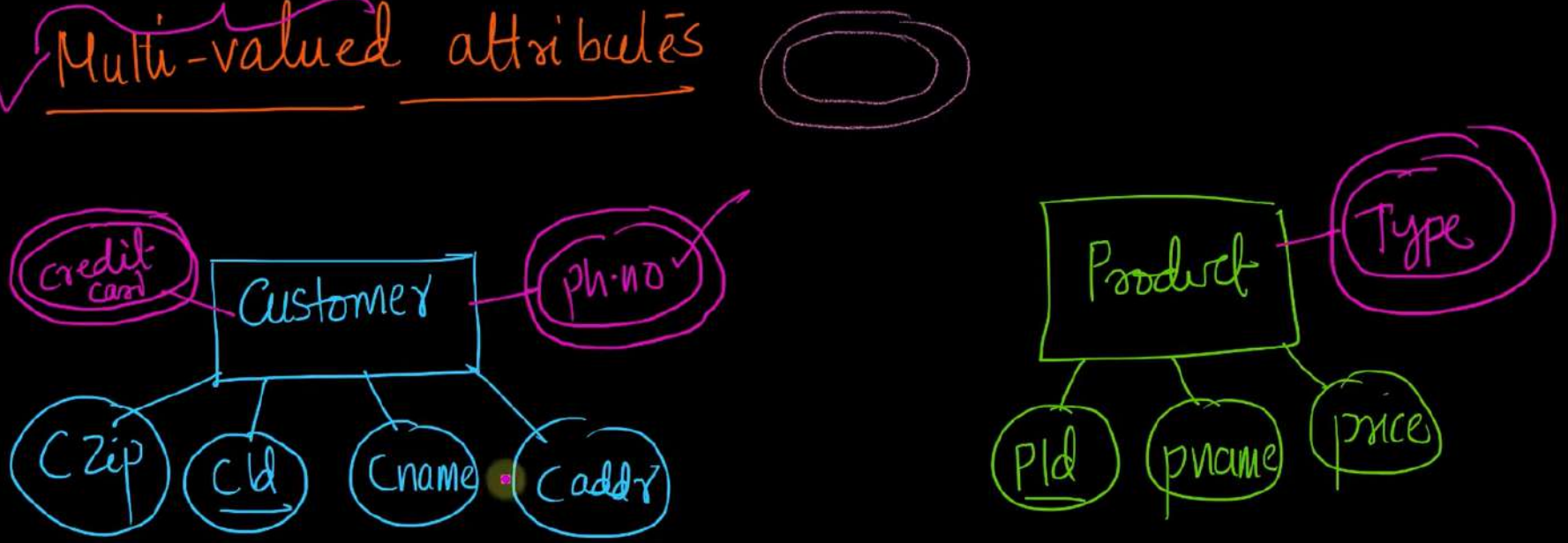
Key attributes :





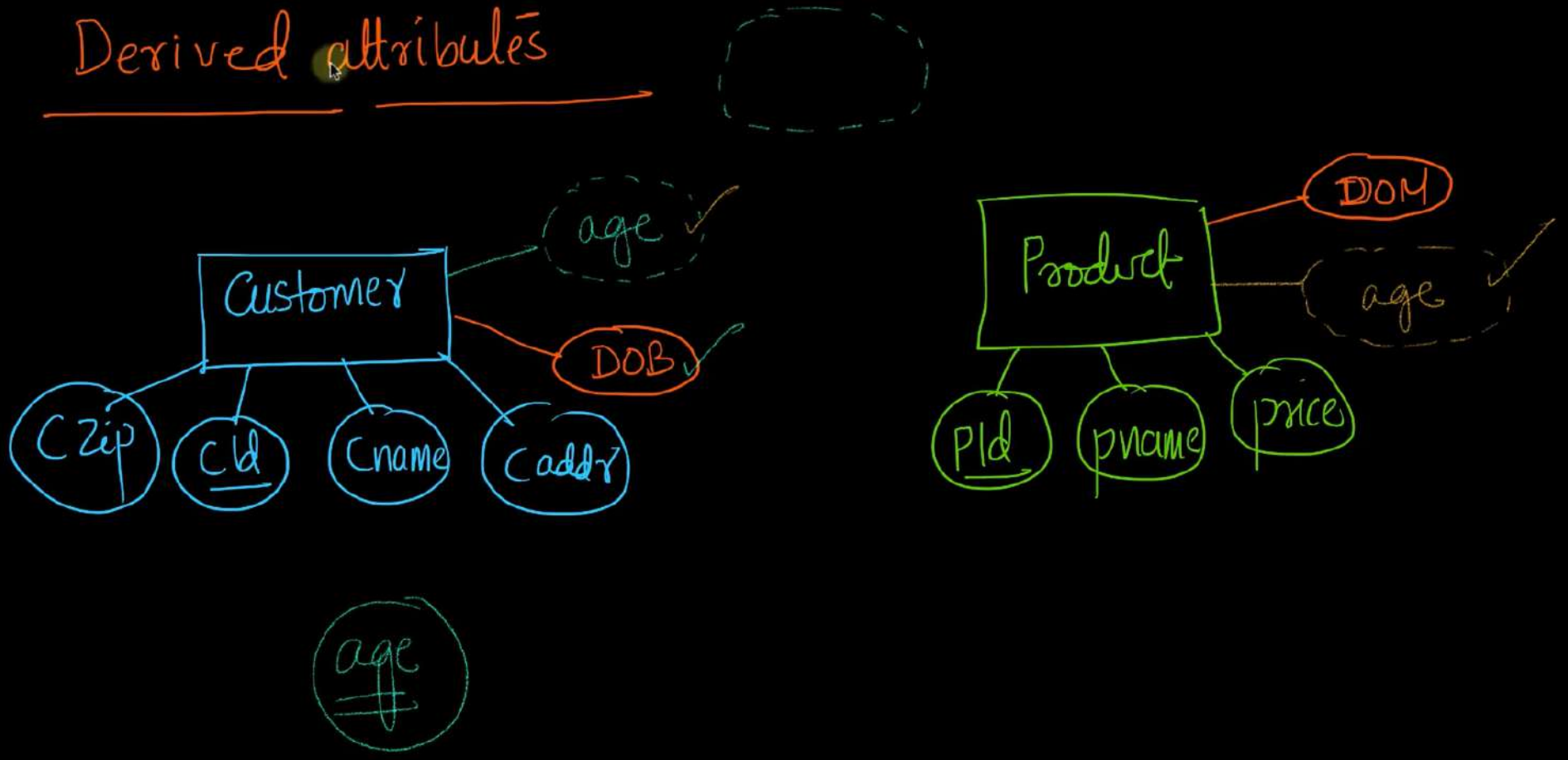
APPLIED COURSE

Multi-valued attributes

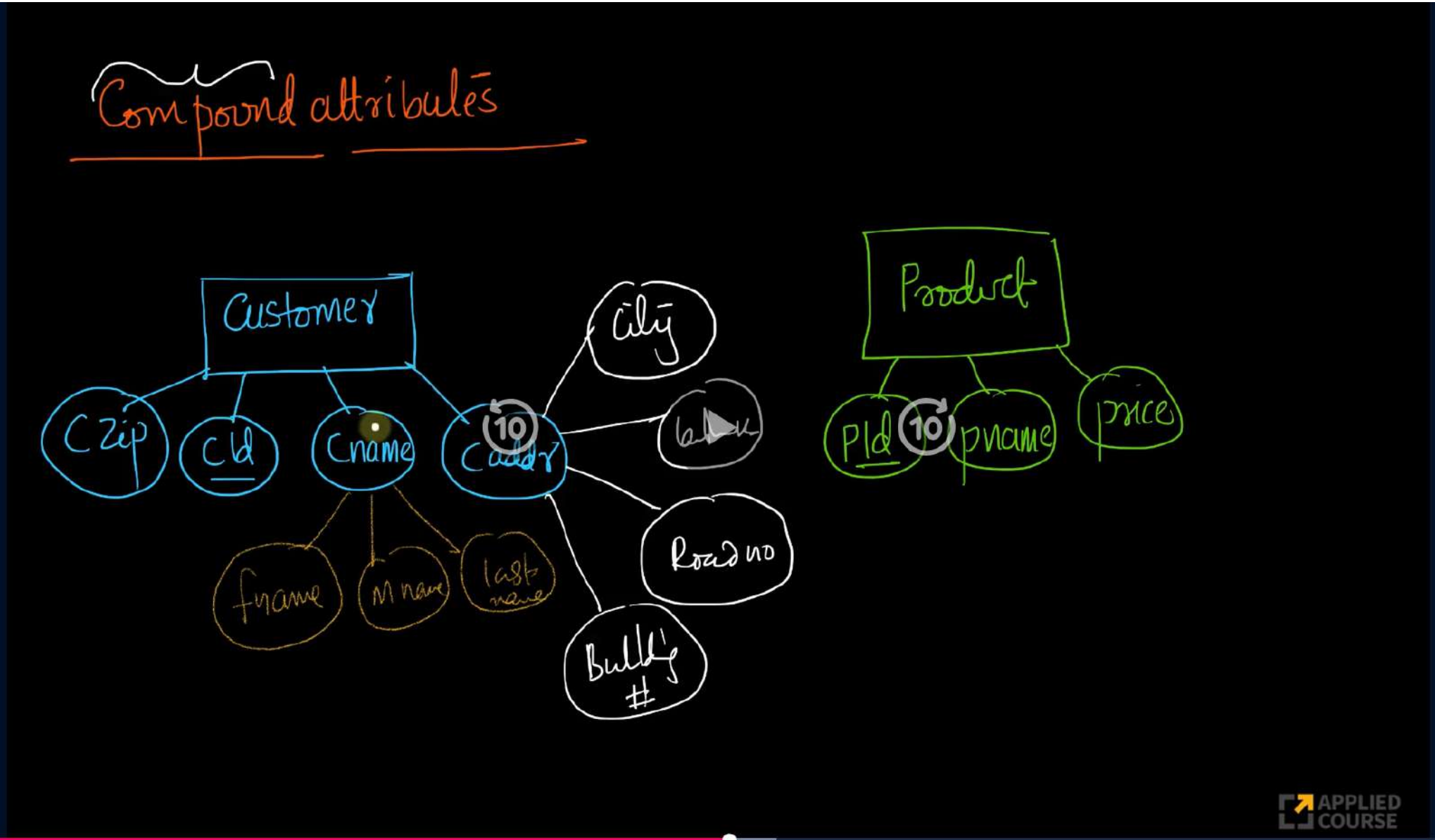


APPLIED COURSE

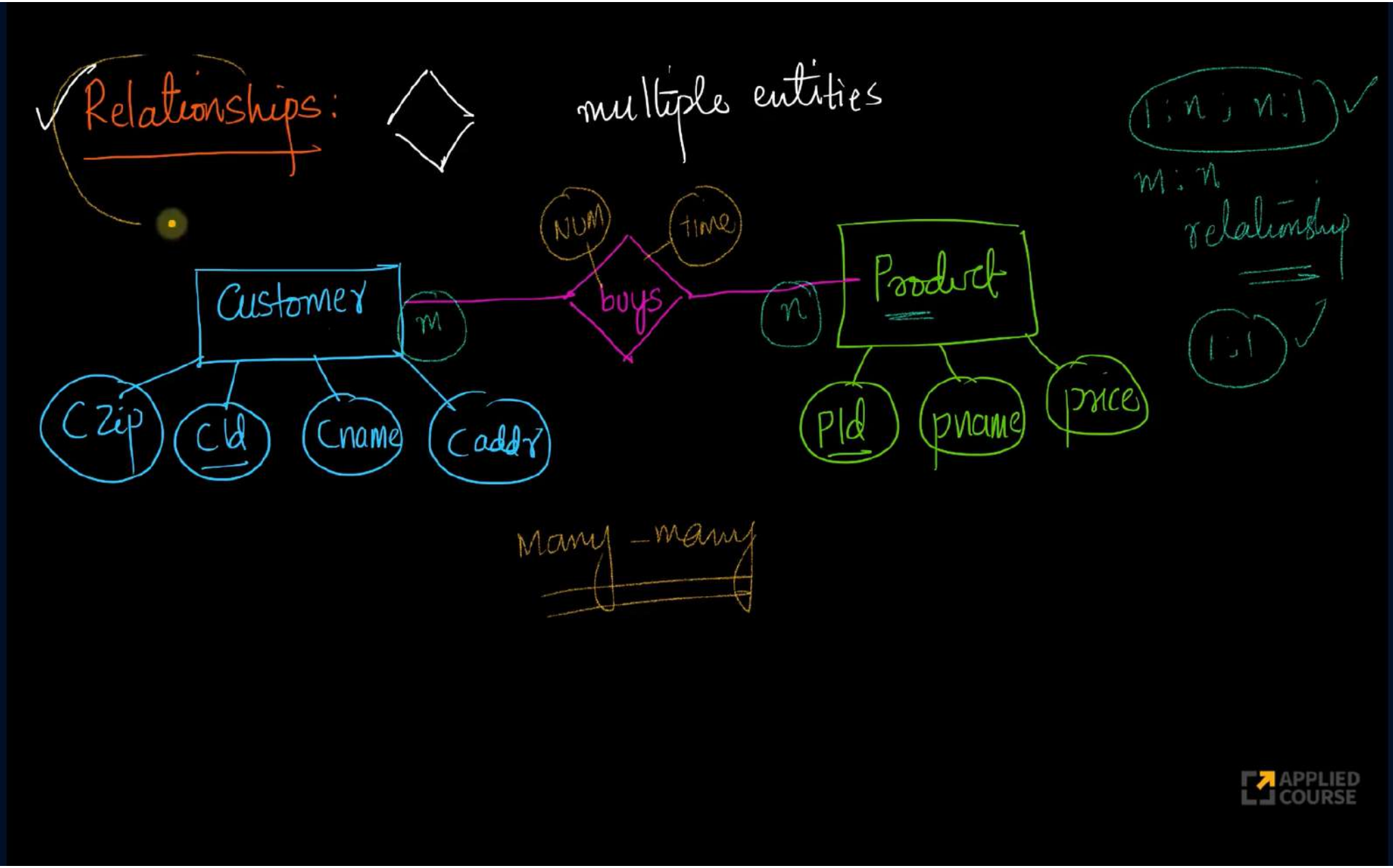
Derived attributes



APPLIED COURSE

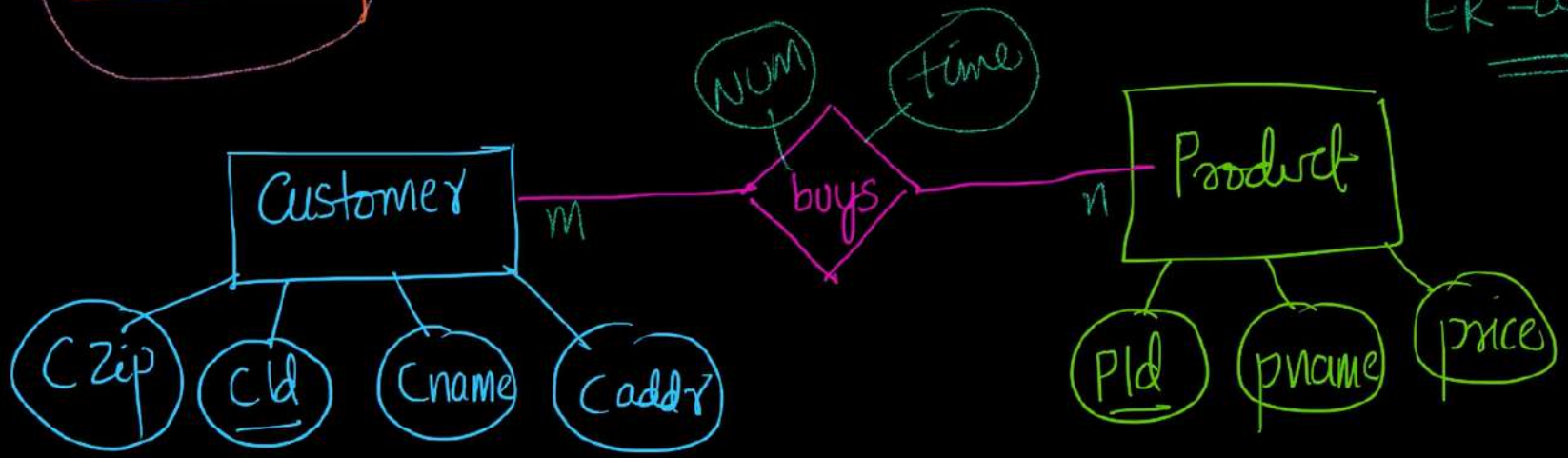


18:34 / 36:37
Autoplay

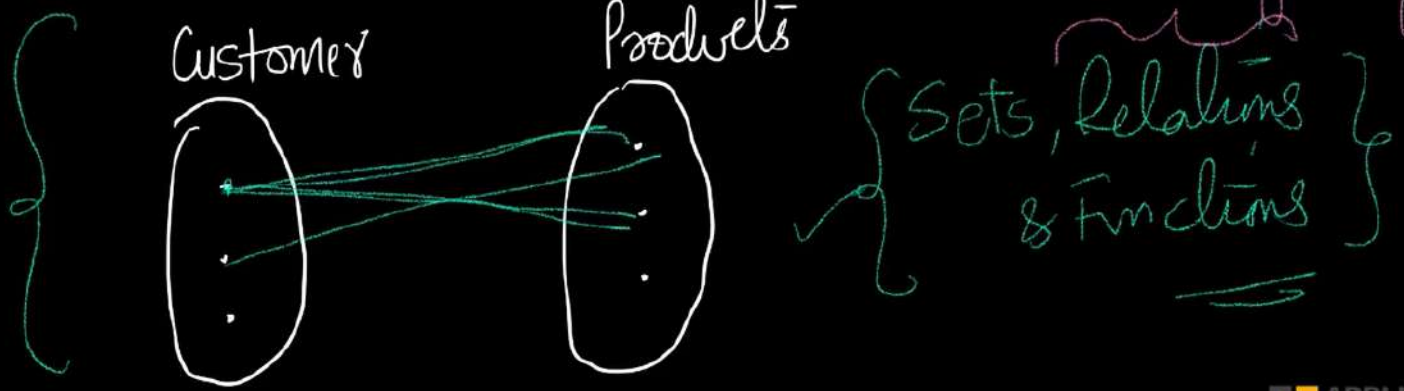

Relationships:
multiple entities
1:n ; n:1
m:n relationship
1:1
Customer
buys
Product
NUM
time
m
n
Czip
Cid
Cname
Caddr
Pid
pname
price
Many-many

Relationships:

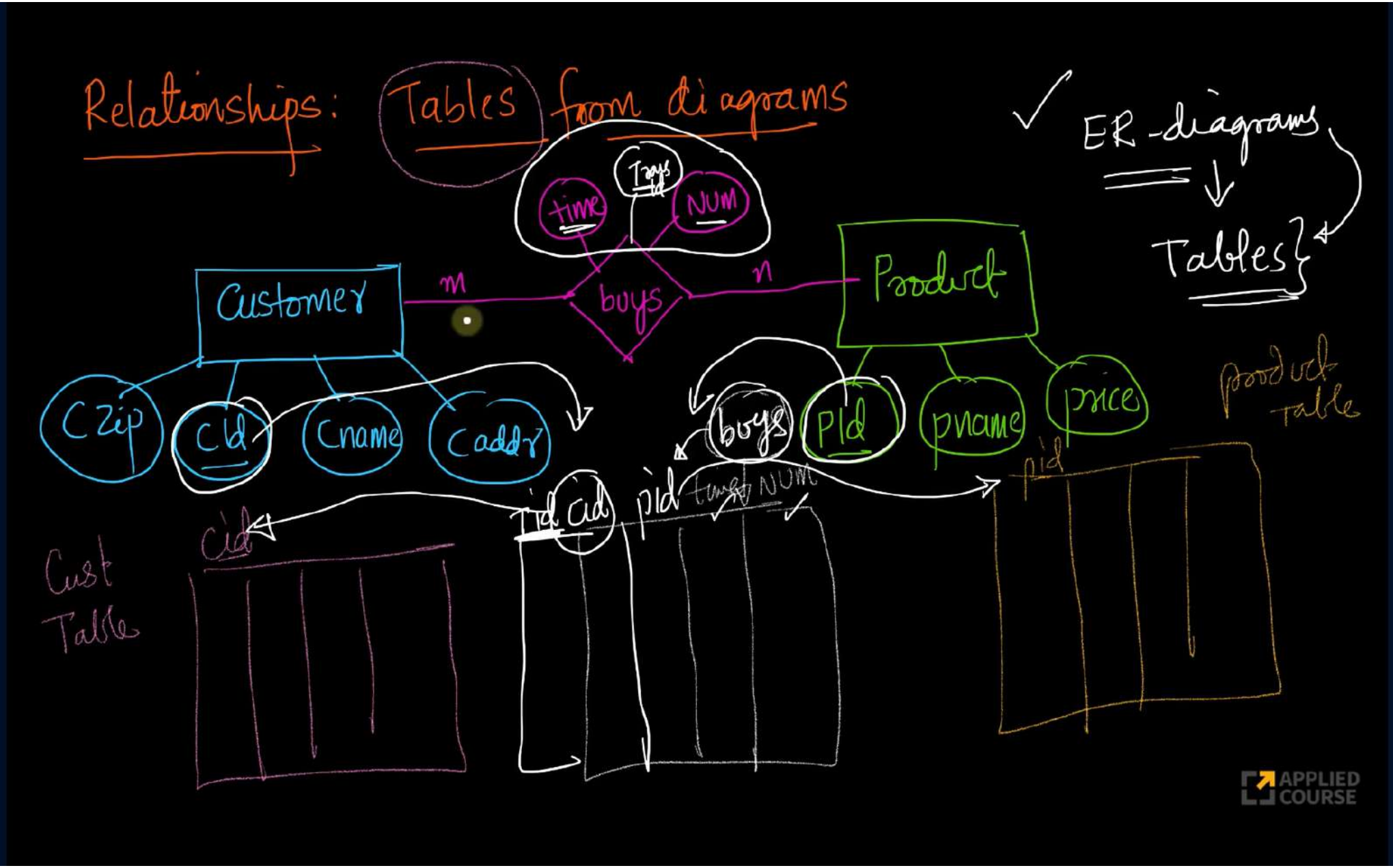
ER-diagrams

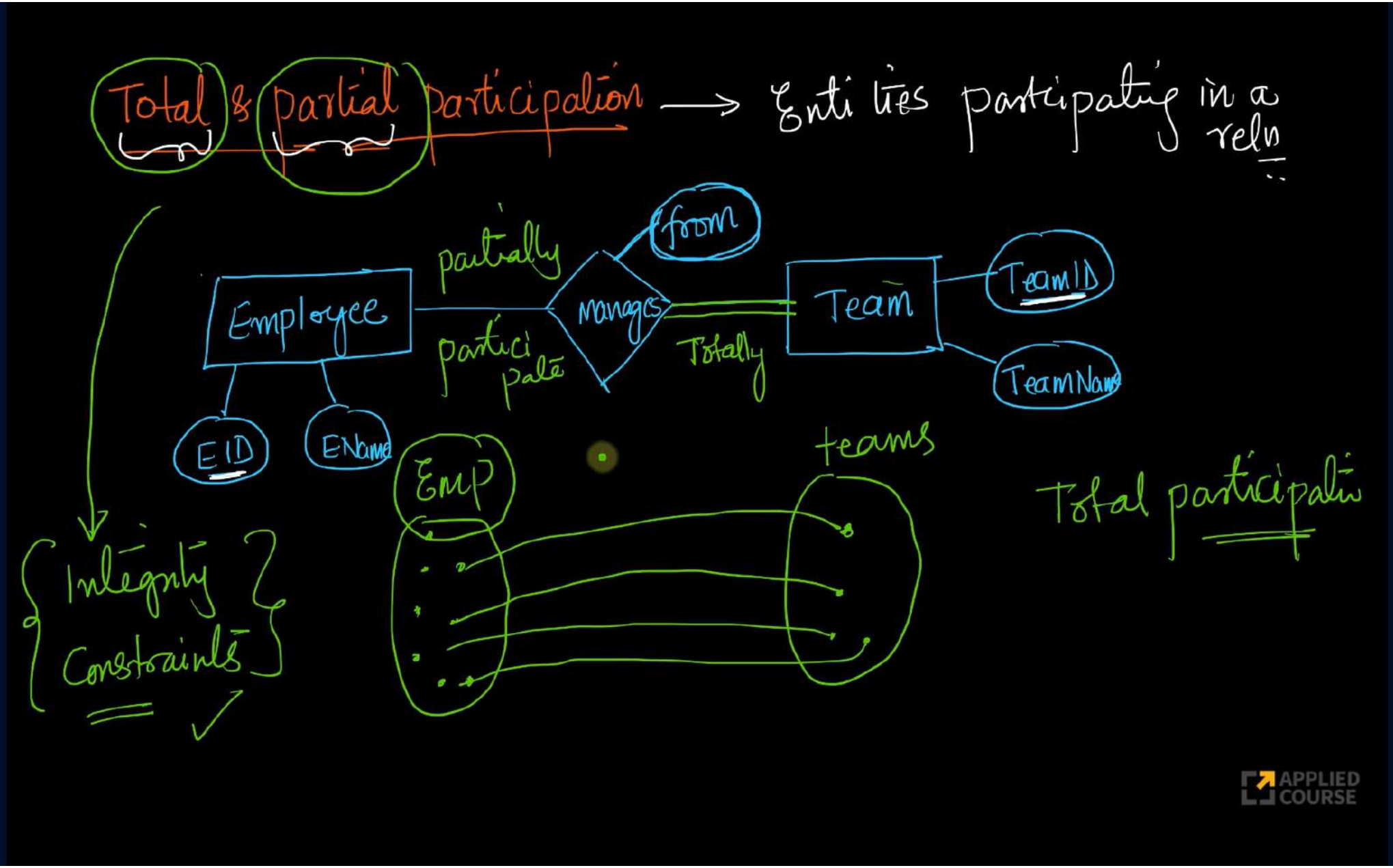


many-many



APPLIED COURSE


Relationships: Tables from diagrams
ER-diagrams
Tables
Customer
m
buys
n
Product
time
Trays id
NUM
Czip
Cid
Cname
Caddr
buys
Pid
pname
price
product table
Cust Table
cid
Tid cid
pid
time
NUM
pid
APPLIED COURSE


Total & partial participation → Entities participating in a relⁿ
Employee
partially
participate
manages
from
Totally
Team
TeamID
TeamName
EID
EName
Emp
teams
Integrity Constraints
Total participation
APPLIED COURSE

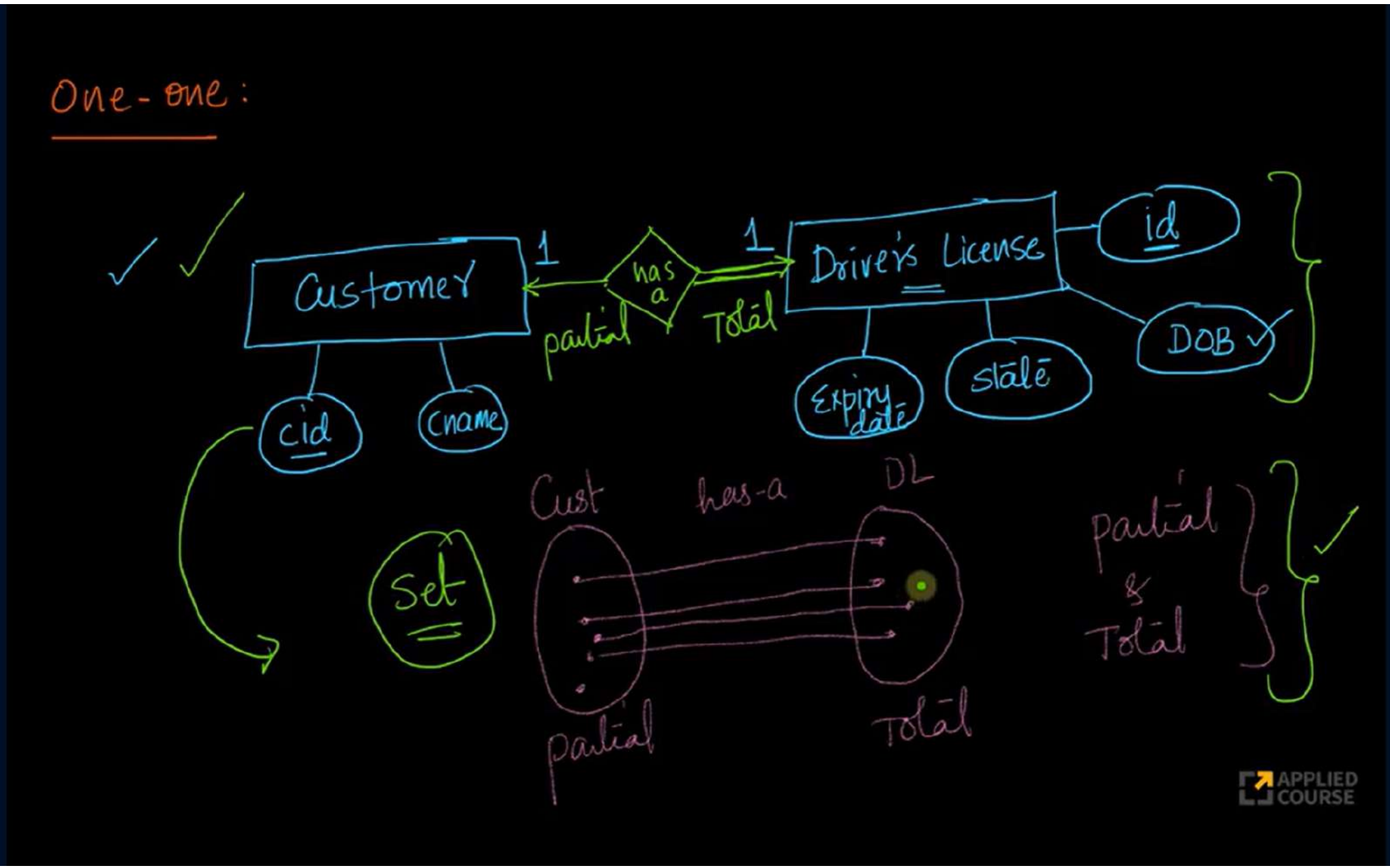
✓ Cardinality of Relationships

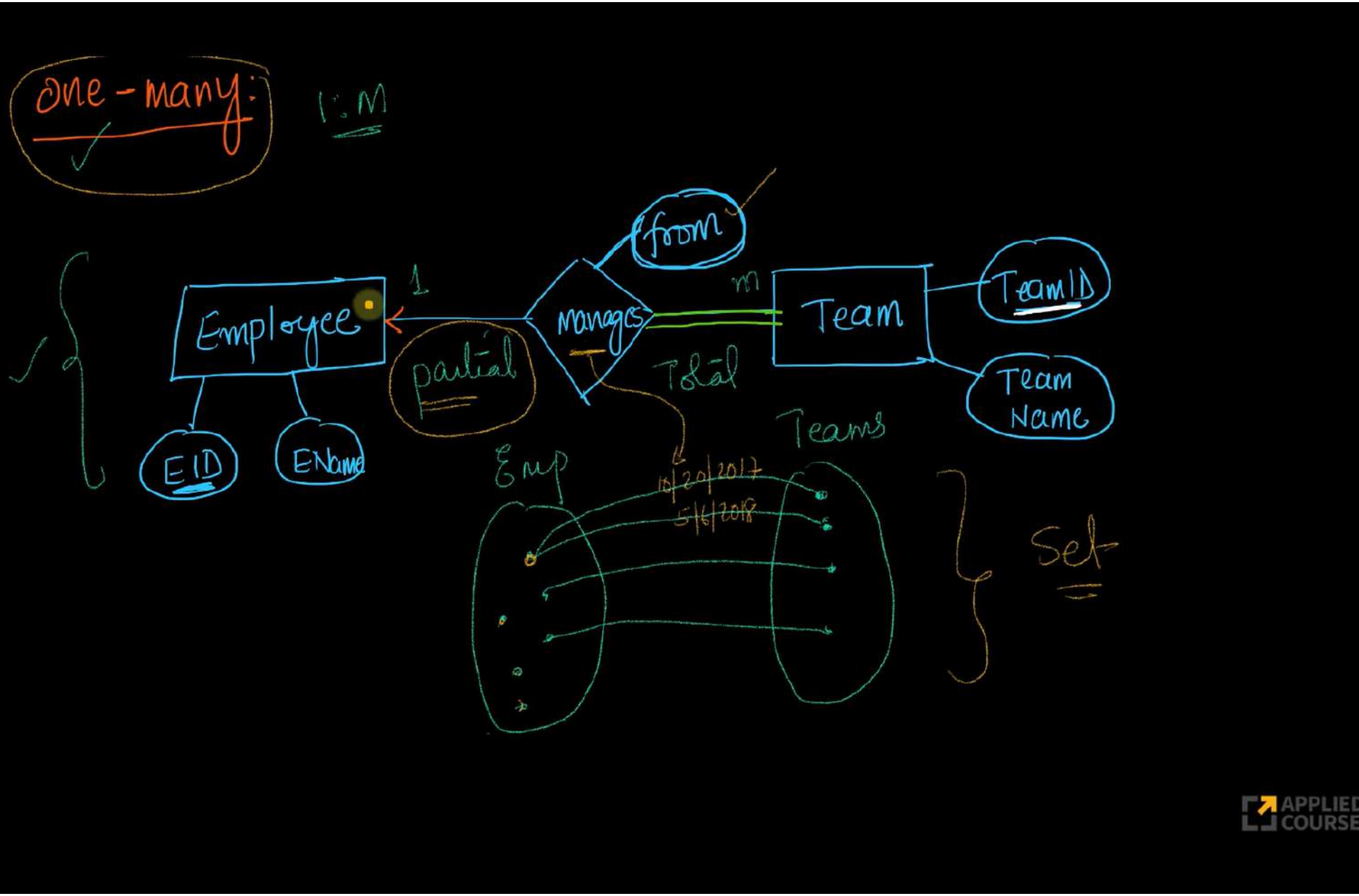
- one - one
- one - many
- many - one
- ✓ many - many → Cust – buys – Product

→ Sets & Relations ✓ → diagrams

APPLIED COURSE

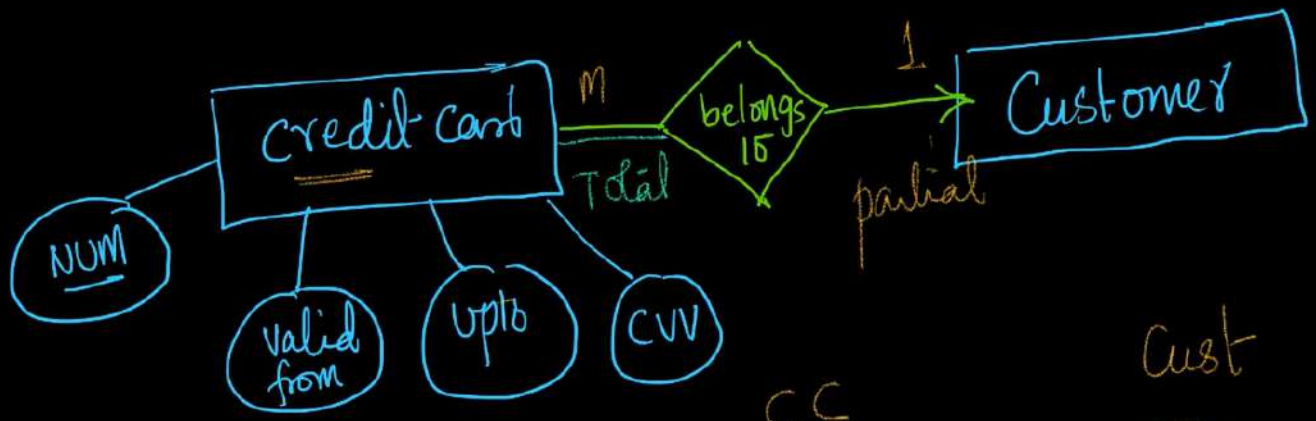
One-one:

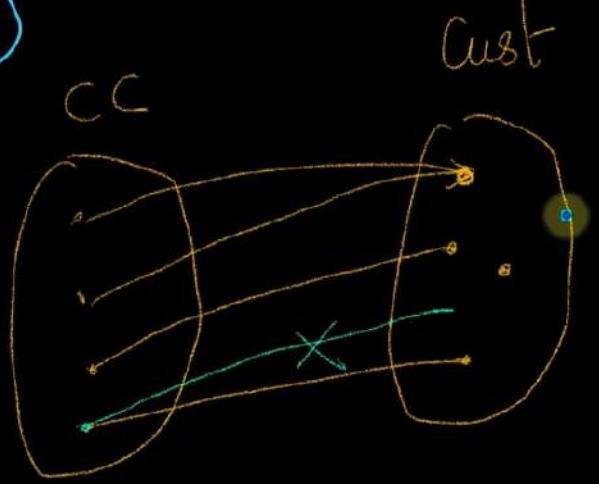

Customer
1
has a
1
Drive's License
id
DOB
Expiry date
stale
partial
Total
cid
cname
Set
Cust
has-a
DL
partial
Total
partial & Total
APPLIED COURSE



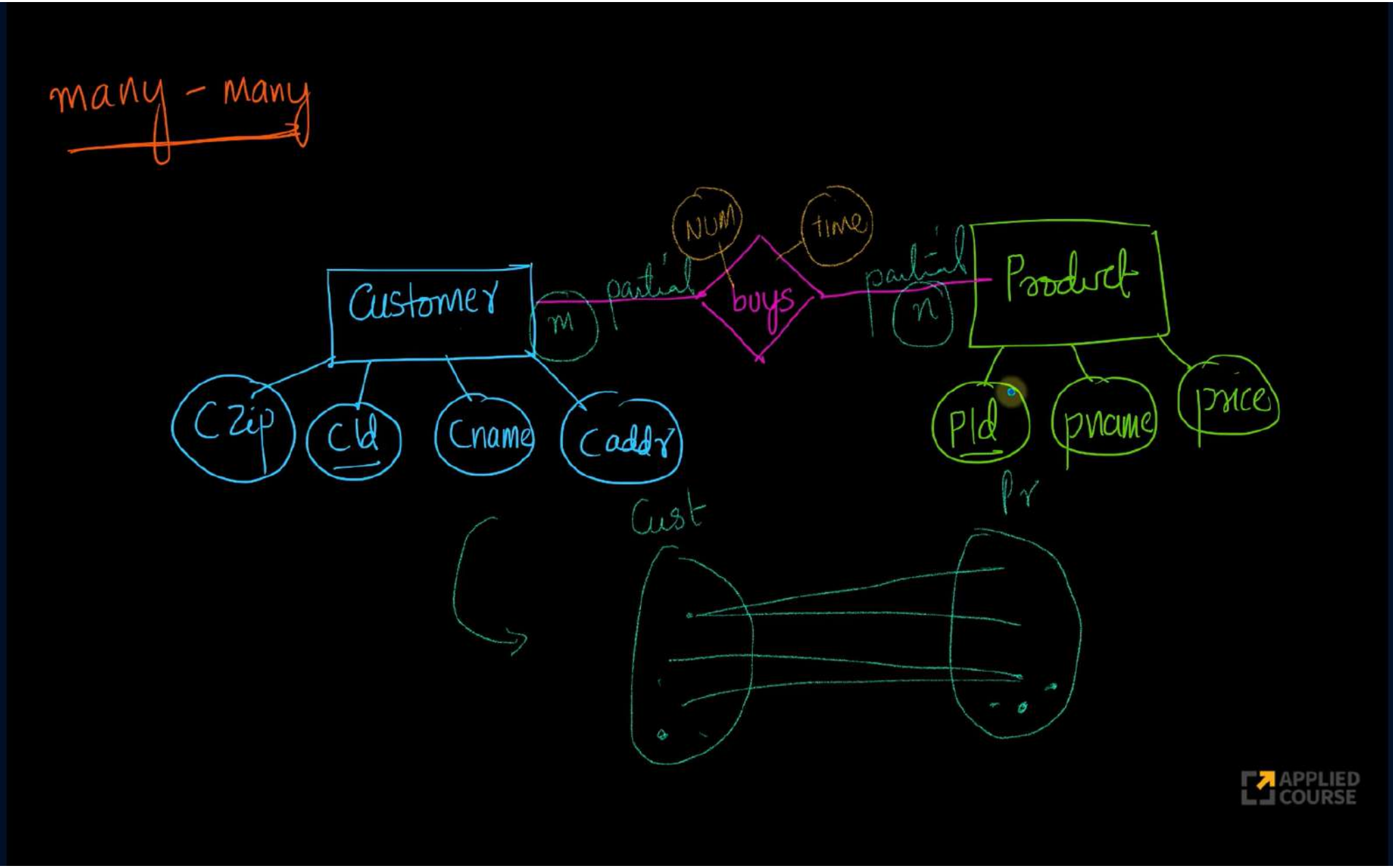
APPLIED COURSE

many - one





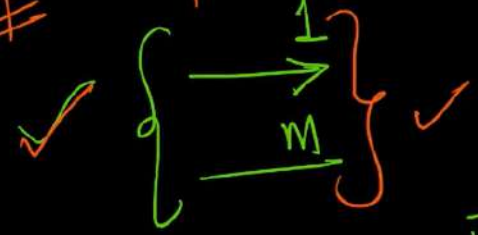
APPLIED COURSE

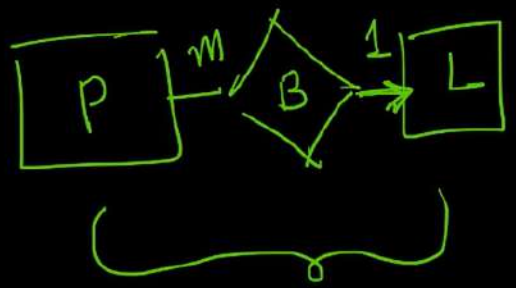

many - many
Customer
Czip
Cid
Cname
Caddr
m
partial
NUM
time
buys
partial
n
Product
Pid
pname
price
Cust
Pr

Alternatives conventions:

many-one:

popular



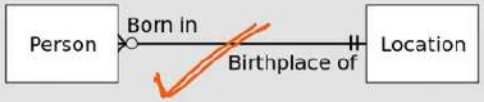


Chen

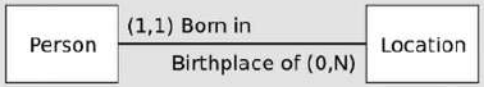
IDEF1X

Bachman

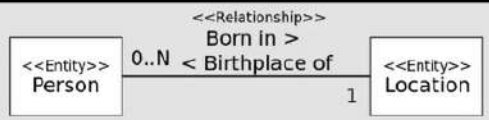
Martin / IE / Crow's Foot



Min-Max / ISO



UML



wiki

APPLIED COURSE

Constructing tables from ER-diagrams

Relational DB

✓ Cardinality
✓ Participation
✓

Keys

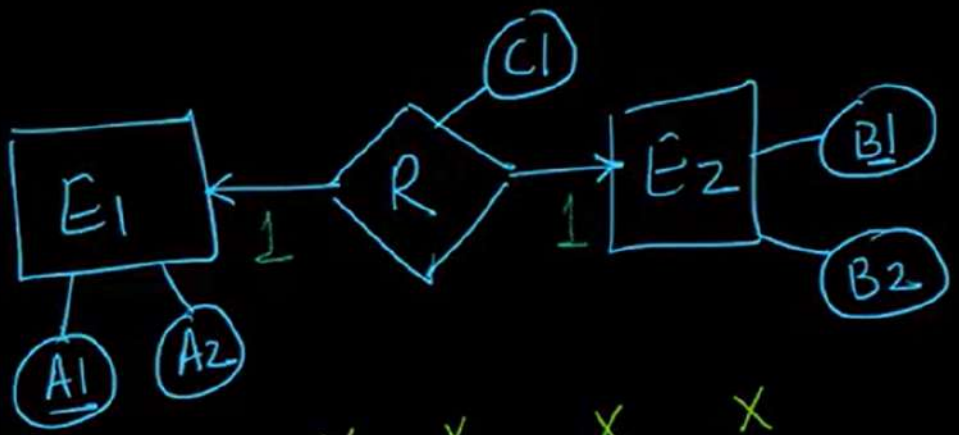
1. Minimize the # tables
2. Primary key → Cannot be NULL is a must
3. each cell must have only one val

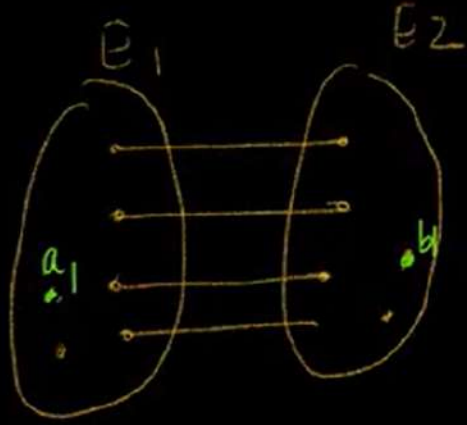
NULL

APPLIED COURSE

One-one + Partial-partial

min # tables ✓



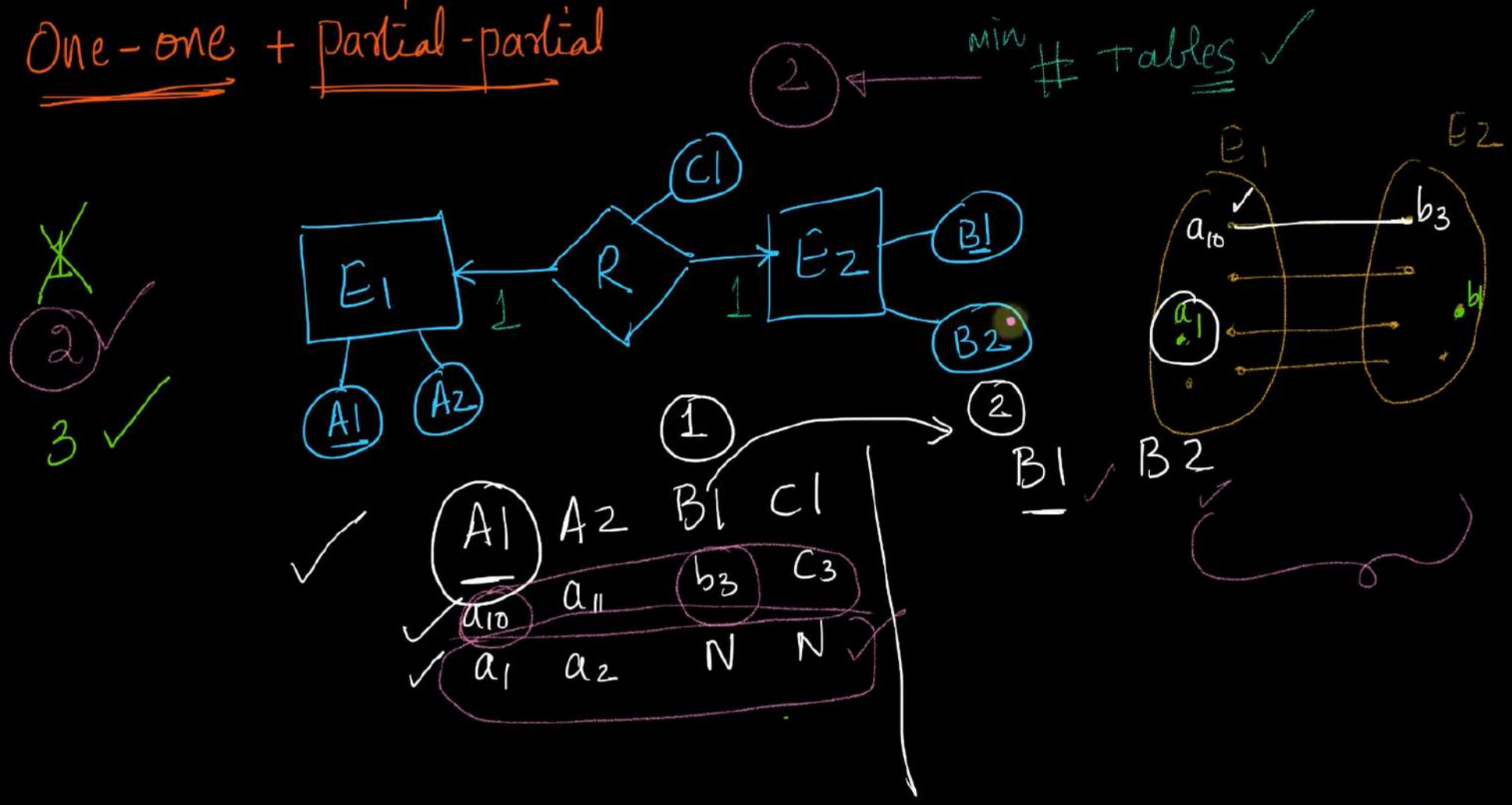


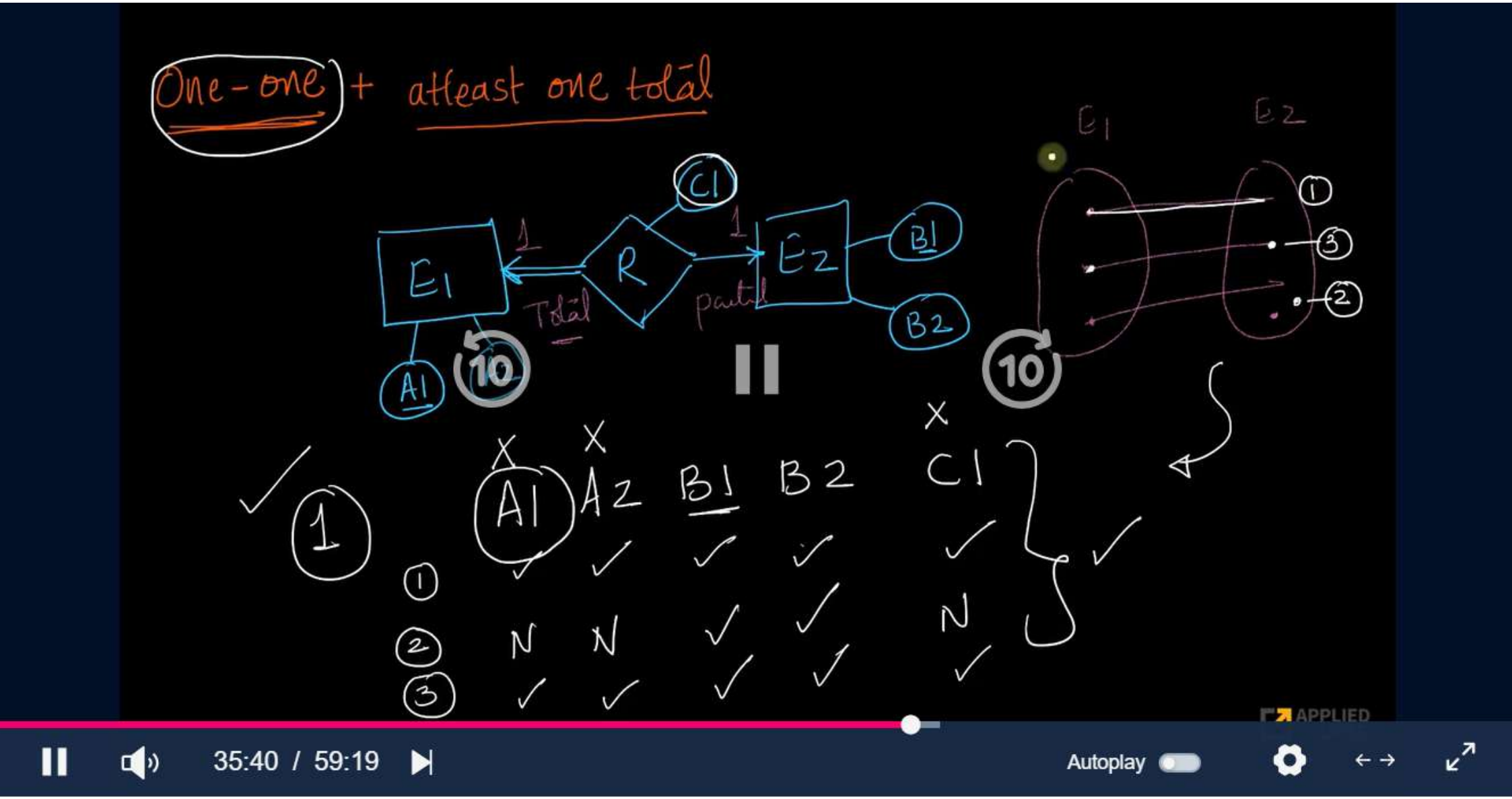
(1)

X A1	X A2	X B1	X B2	X C1
→ a_1	a_2	N	N	N }
N	N	b_1	b_2	N }

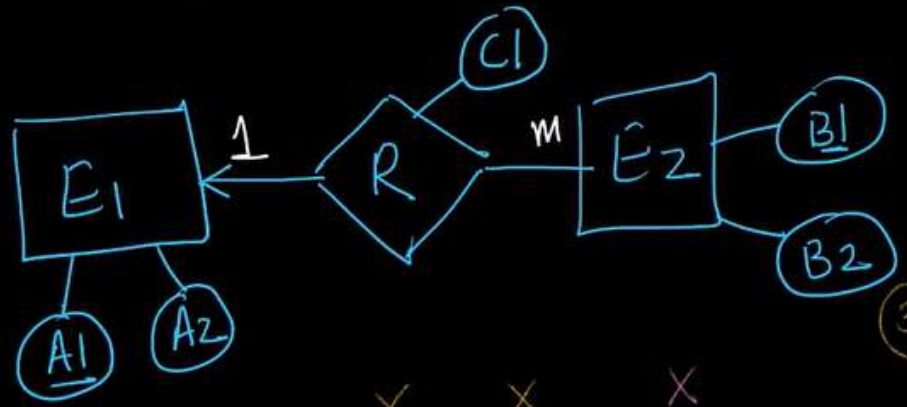
APPLIED COURSE

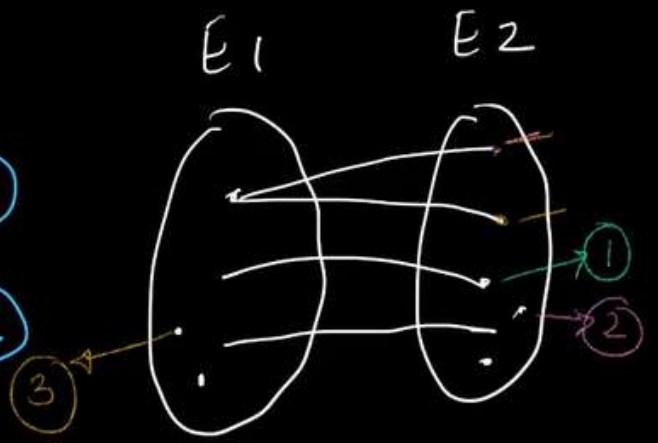
One-one + Partial-partial



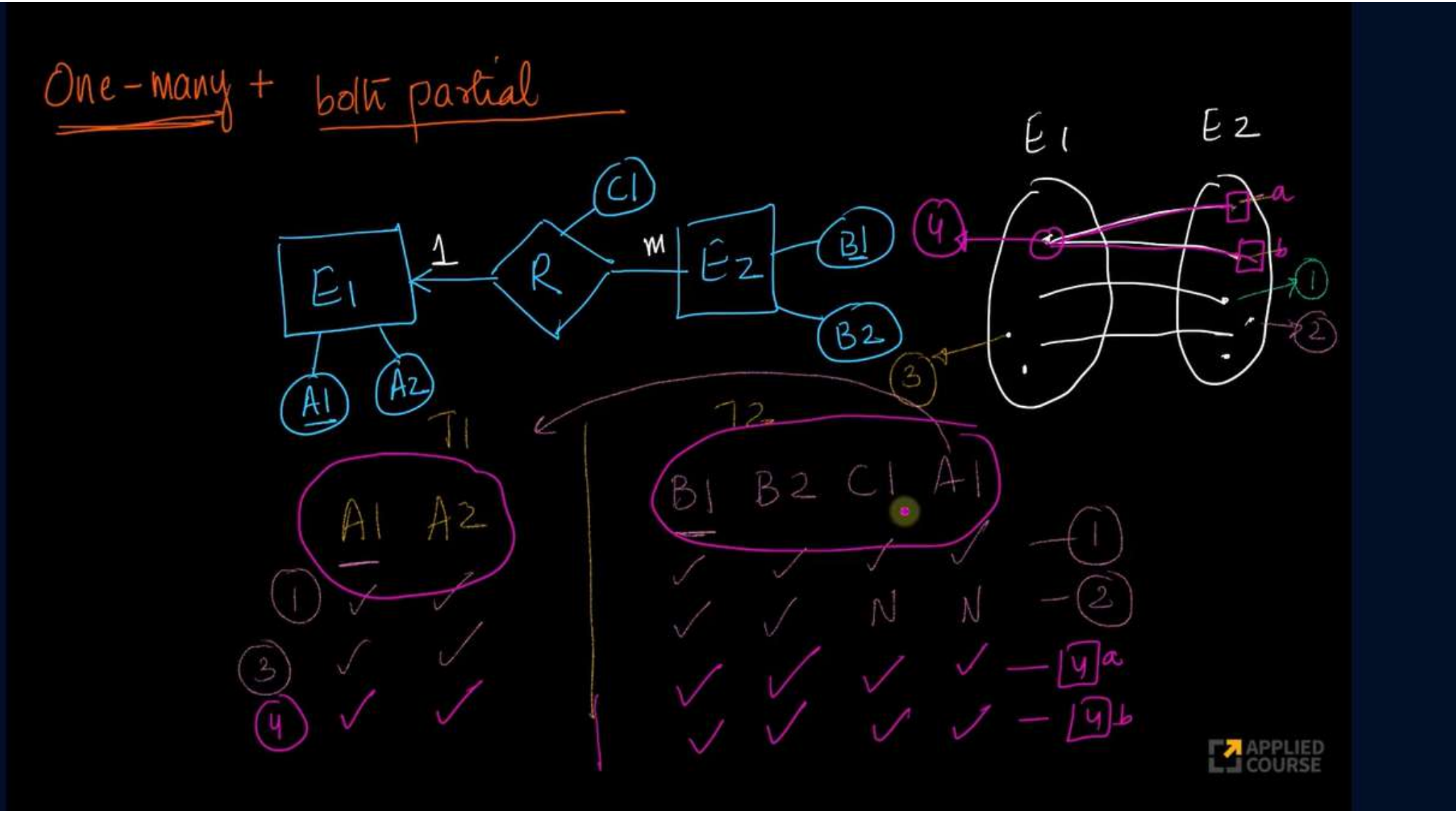

One-one + atleast one total
E1
R
E2
C1
B1
B2
A1
1
1
Total
partial
10
10
E1
E2
1
3
2
1
A1 A2 B1 B2 C1
1
2
3
N N N
APPLIED
35:40 / 59:19
Autoplay

One-many + both partial

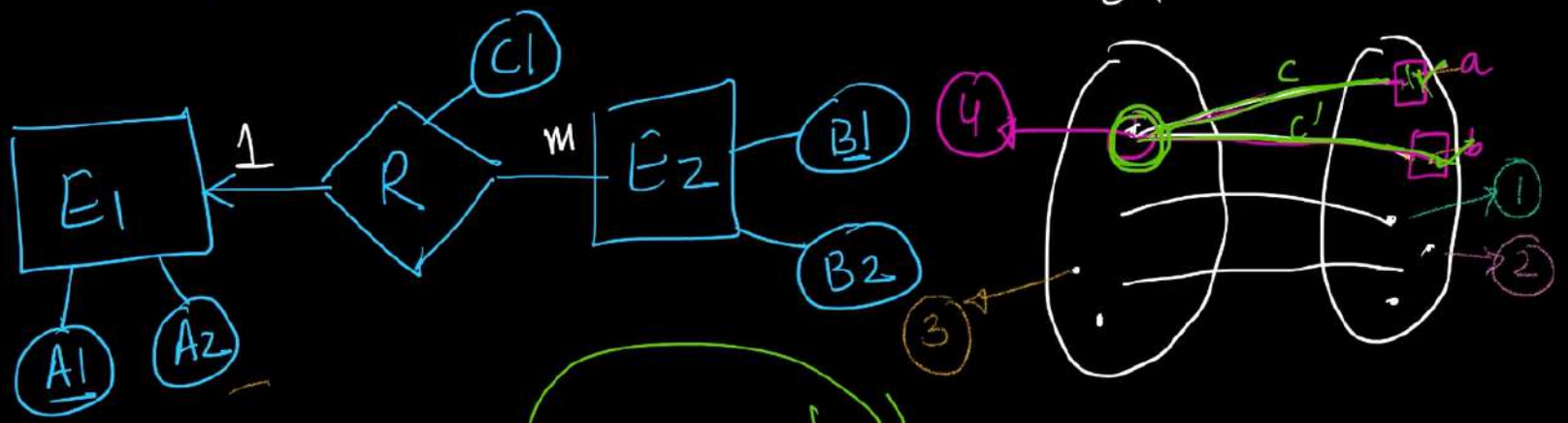


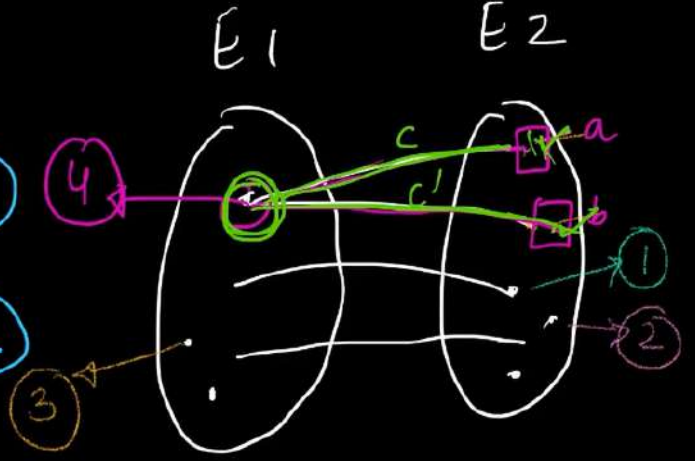


APPLIED COURSE


One-many + both partial
E1
E2
R
1
m
C1
B1
B2
A1
A2
T1
T2
A1 A2
B1 B2 C1 A1
N N
a
b
APPLIED COURSE

One-many + both partial

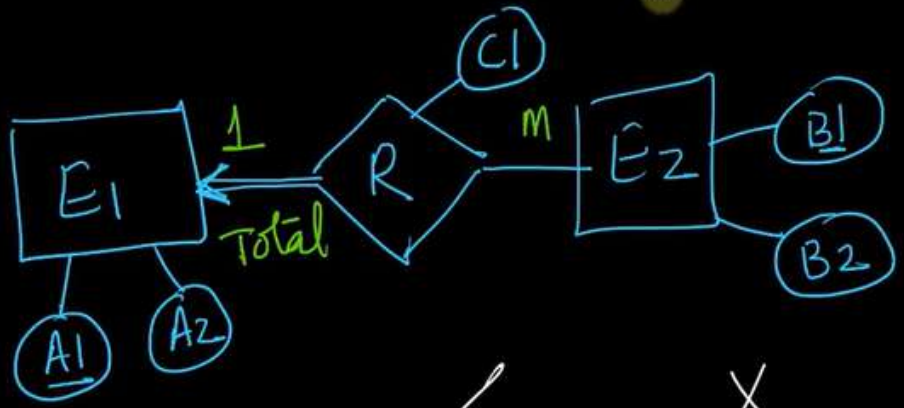


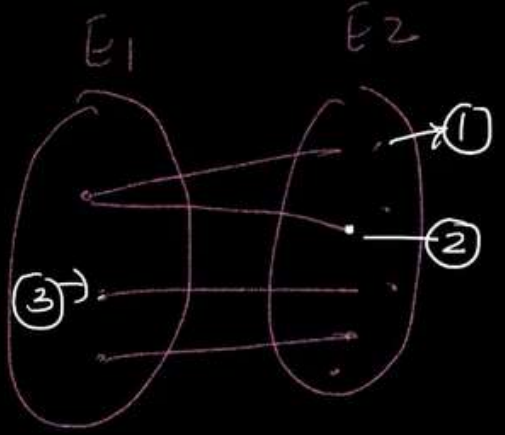


A1	A2	B1	C1	B1	B2
4 →	✓	✓	a,b	c,c'	X

APPLIED COURSE

One-many + one-total



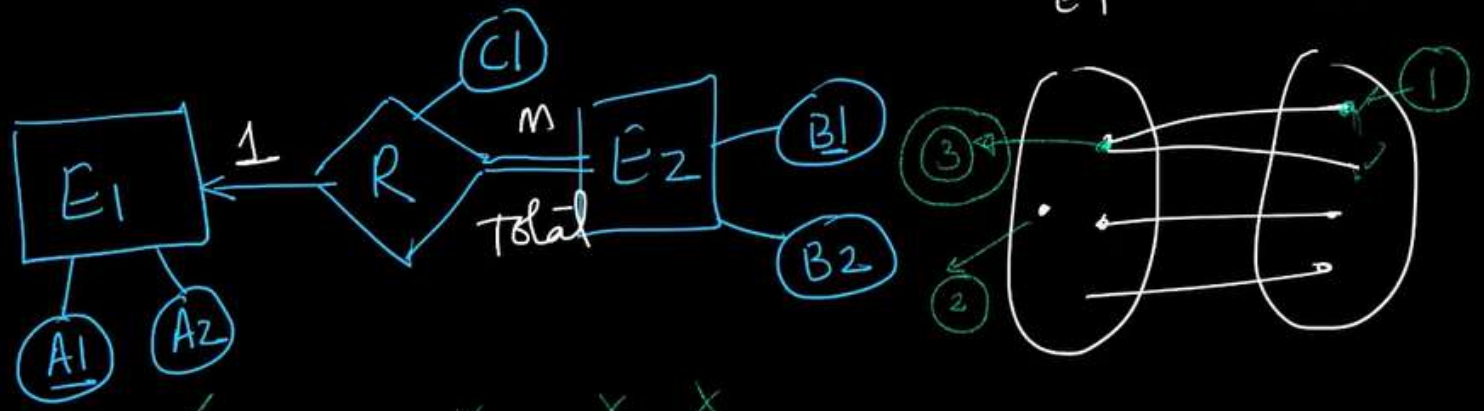


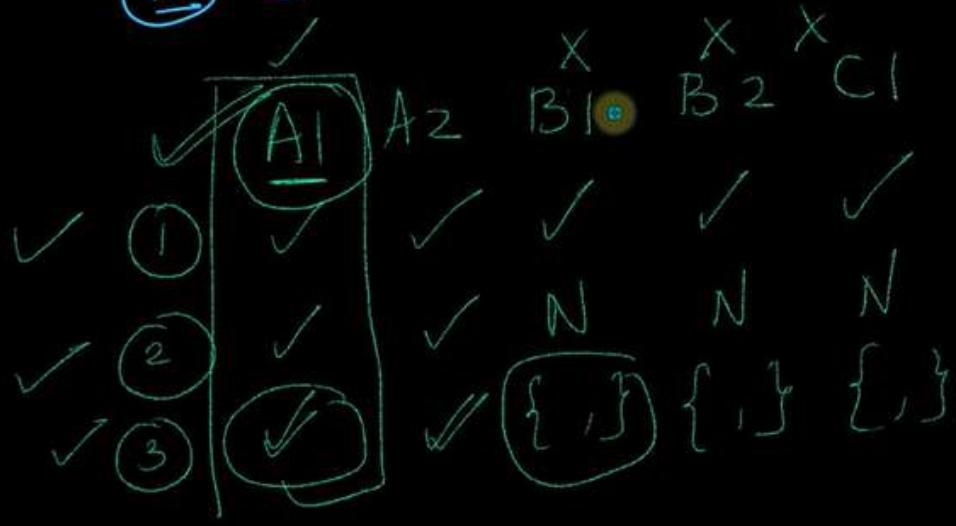
1

	A1	A2	B1	B2	C1
	X	X	✓		X
1	N	N	✓	✓	N
2	✓	✓	✓	✓	✓
3	✓	✓	✓	✓	✓

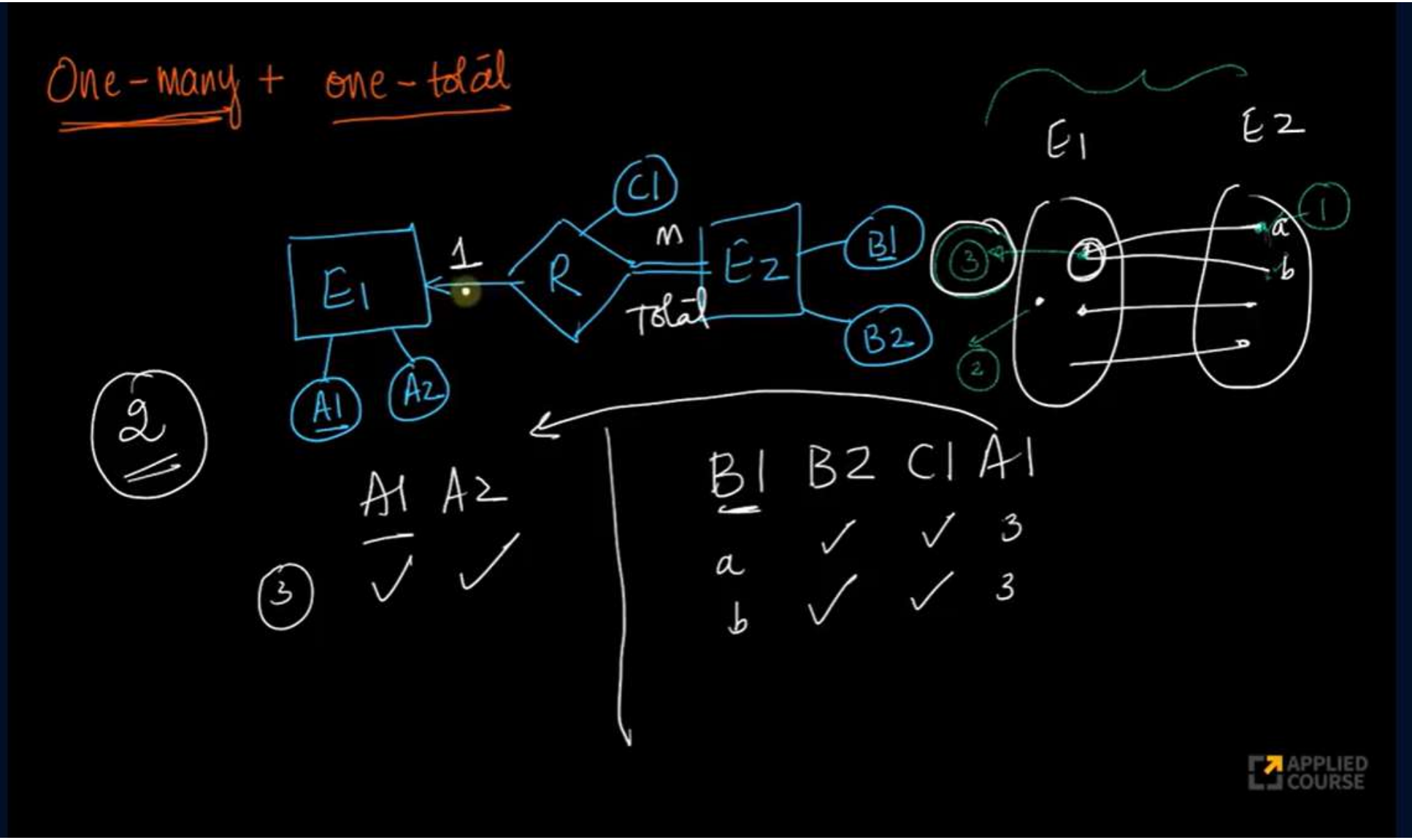
APPLIED COURSE

One-many + one-total

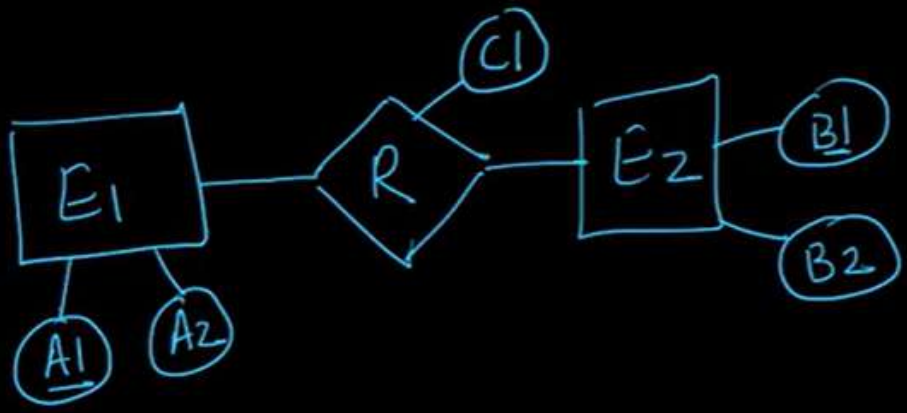


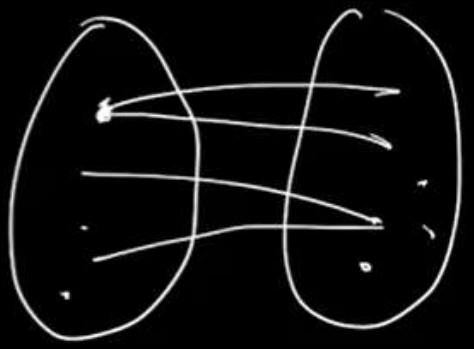


APPLIED COURSE


One-many + one-total
E1
1
R
C1
m
Total
E2
B1
B2
A1
A2
E1
E2
a
b
1
2
3
2
A1 A2
3 ✓ ✓
B1 B2 C1 A1
a ✓ ✓ 3
b ✓ ✓ 3
APPLIED COURSE

many - many + both partial

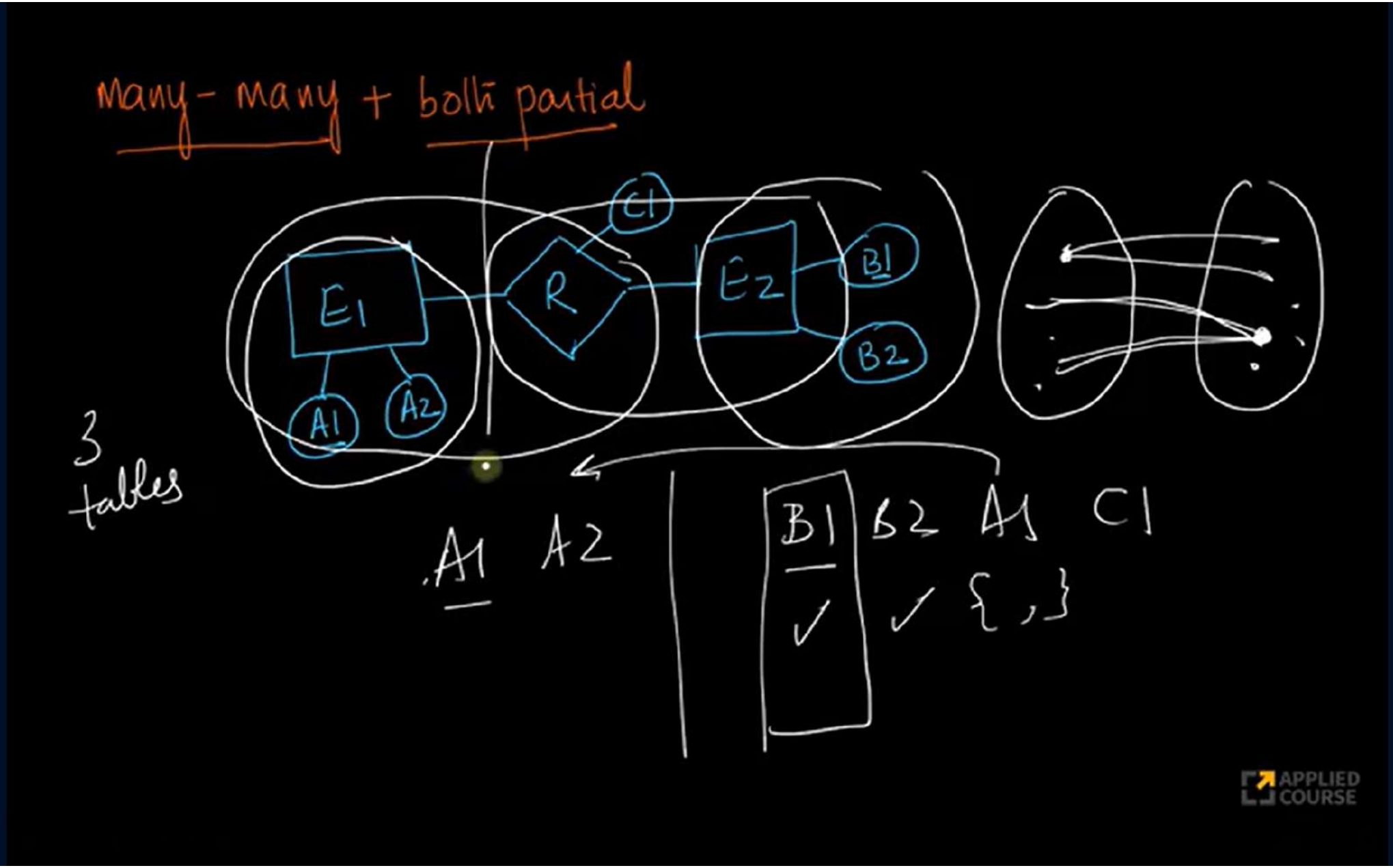




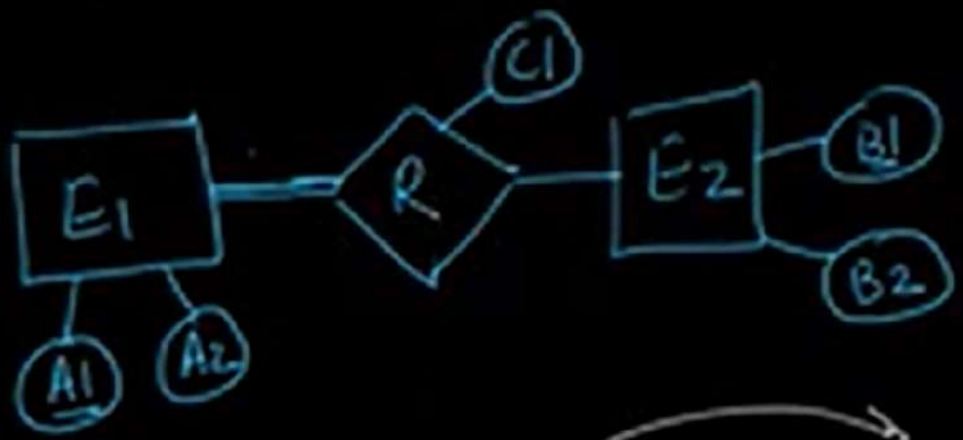
X A1 A2 B1 C1
{ , }

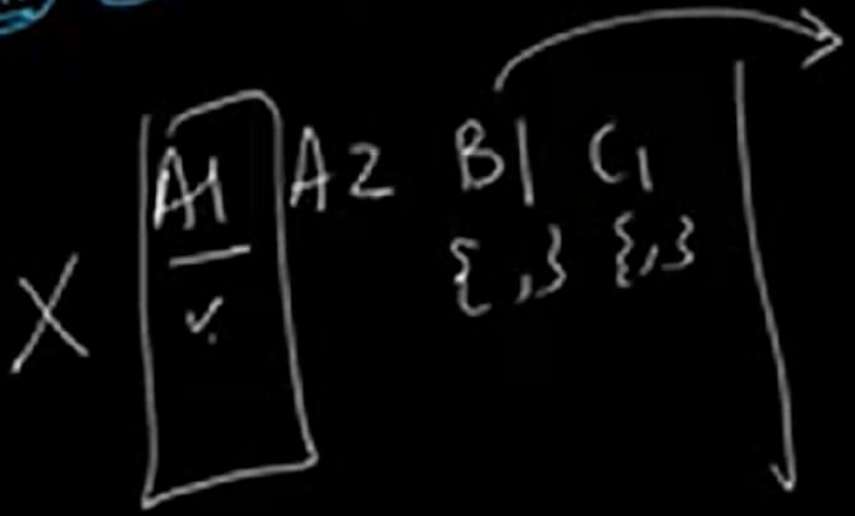
B1 B2

APPLIED COURSE

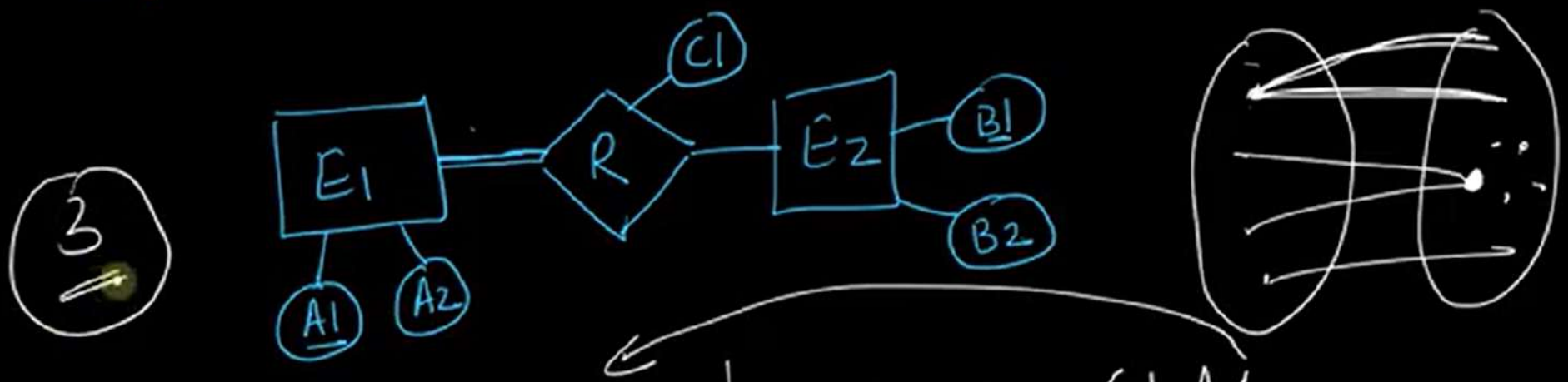

many - many + both partial
E1
R
E2
C1
B1
B2
A1
A2
3 tables
A1 A2
B1 B2 A1 C1
✓ ✓ {,}
APPLIED COURSE

many - many + one - Total





many - many + one - Total



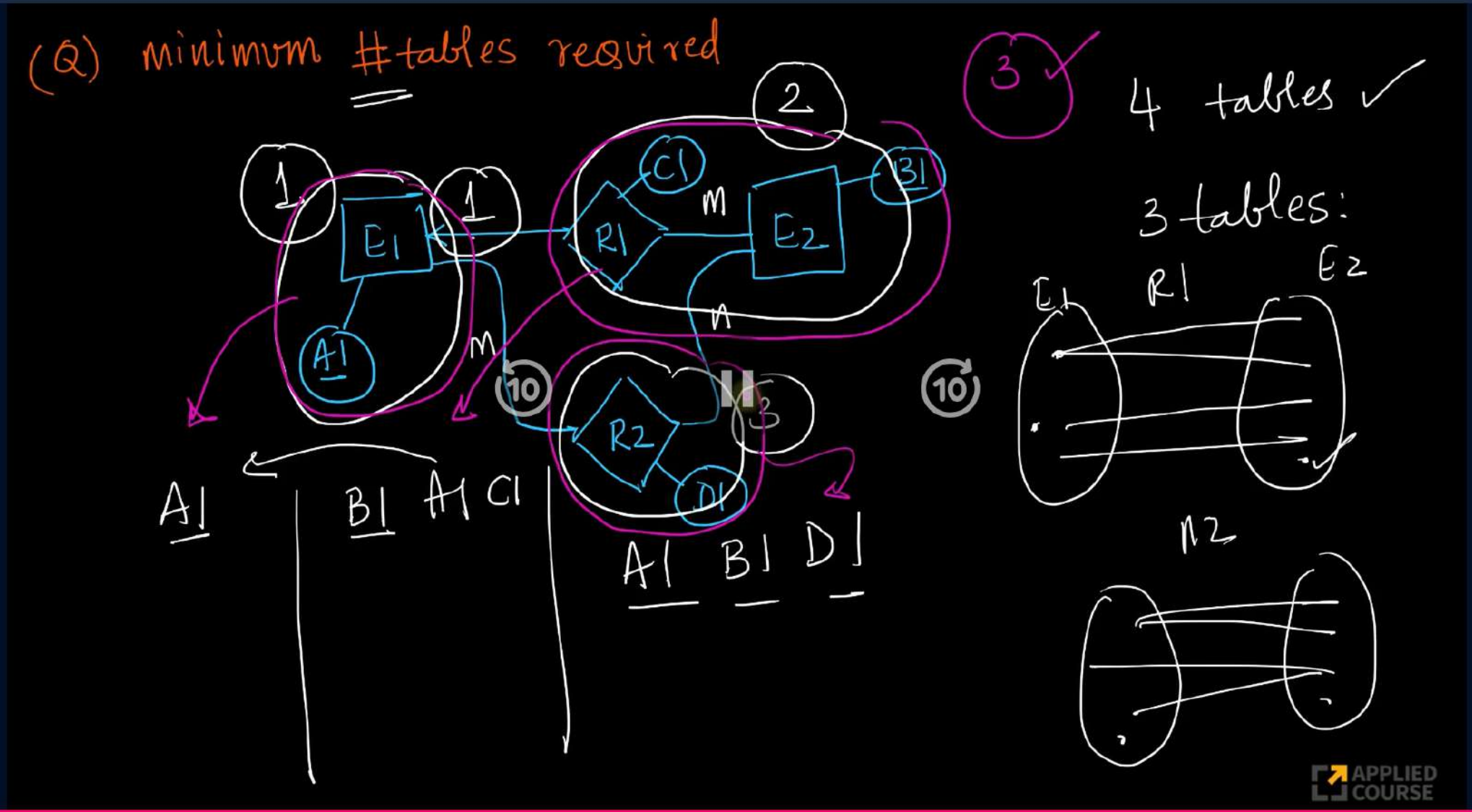
A1 A2

B1 B2 C1 A1

✓ ∈3 ∈3 X

APPLIED COURSE

DBMS Course - Master the Fundamentals and Advanced Concepts



APPLIED COURSE

58:47 / 59:19
Autoplay

Constructing tables from ER-diagrams

Relational DB

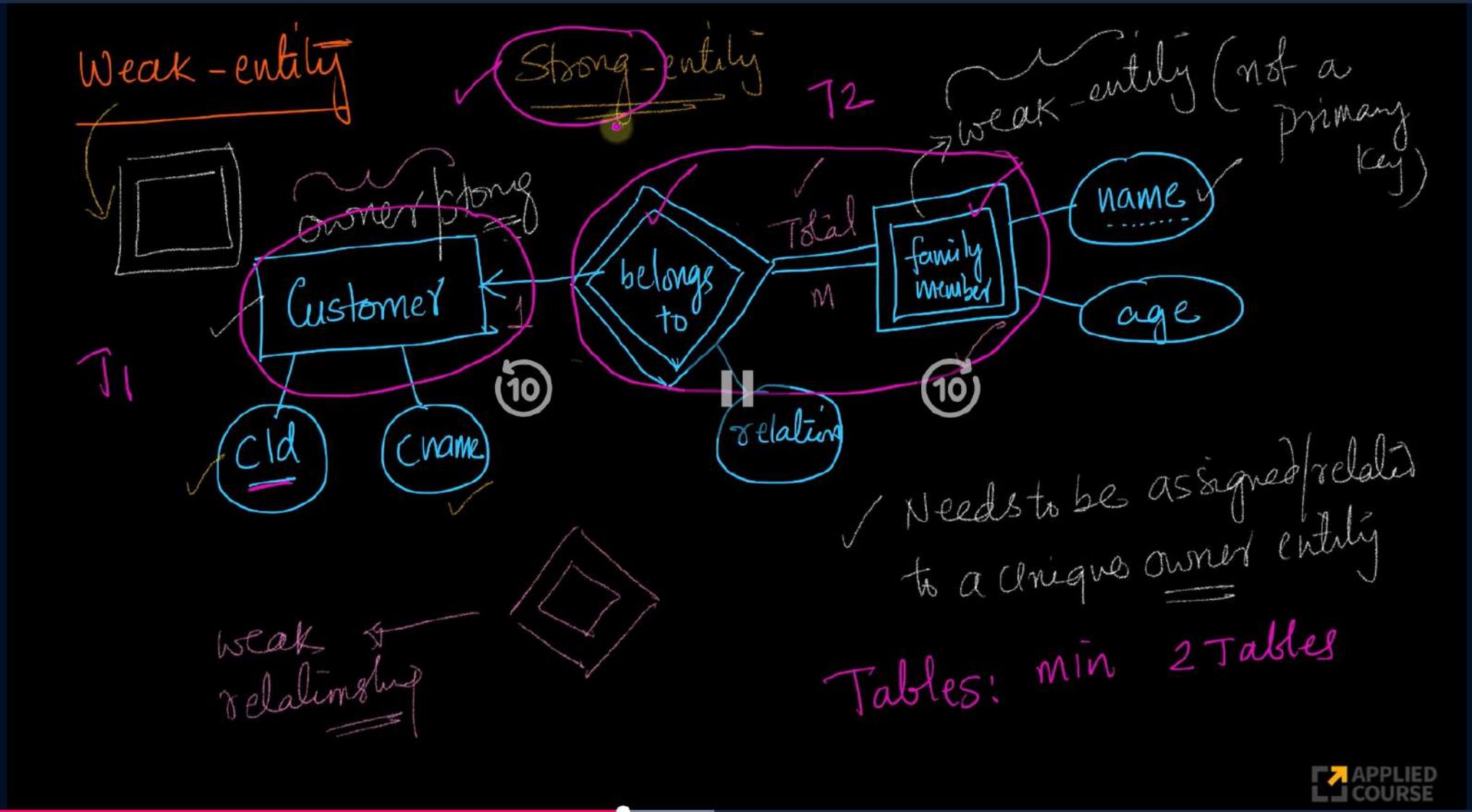
- ✓ Cardinality
- ✓ Participation

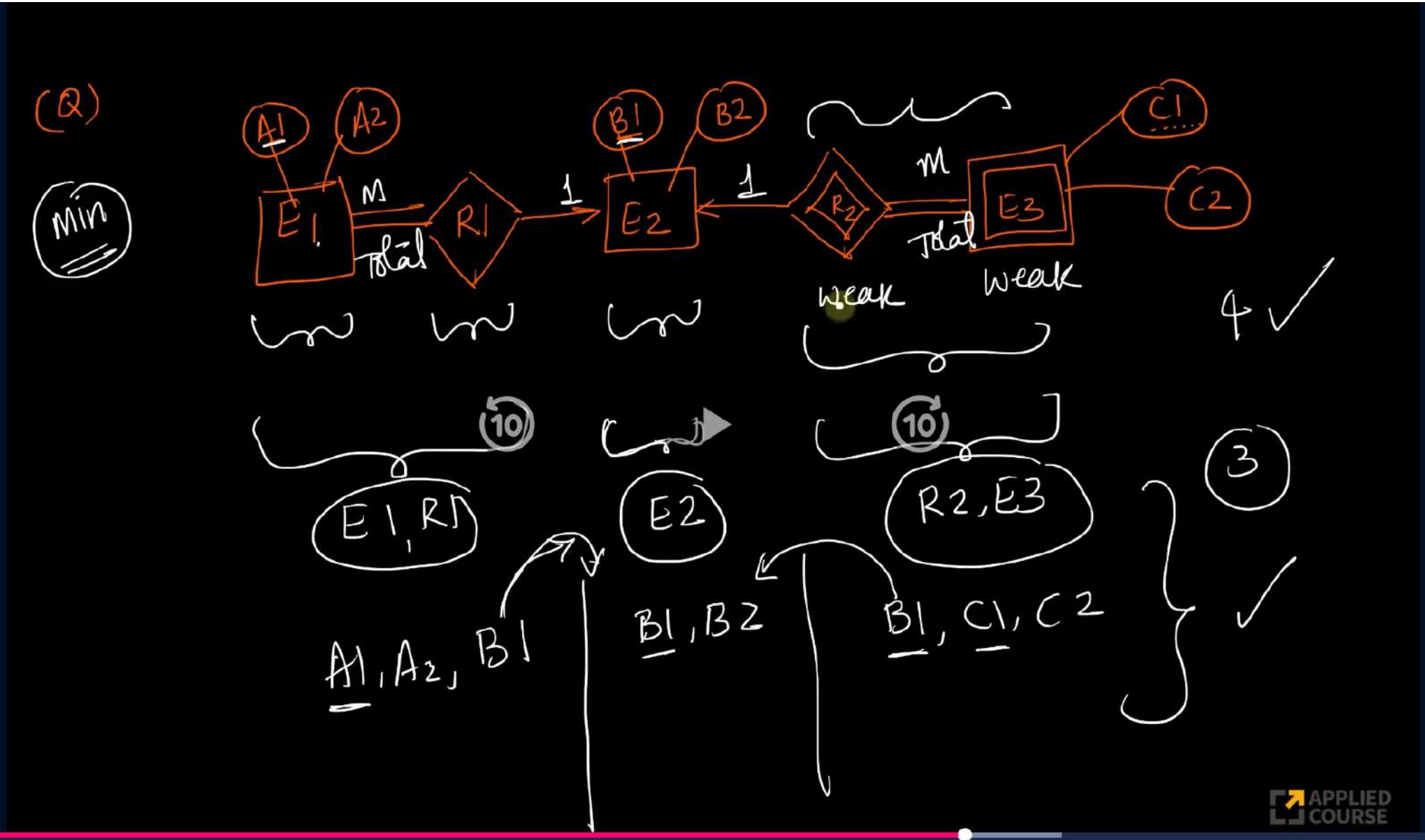
Keys

1. ✓ Minimize the # tables
2. ✓ Primary key (10) → Cannot be NULL is a must
3. ✓ each cell must have only one val

NULL

APPLIED COURSE


Weak-entity
Strong-entity
T2
weak-entity (not a primary key)
owner/strong
Customer
belongs to
Total
M
family member
name
age
1
10
10
T1
Cid
Cname
relation
Needs to be assigned/related to a unique owner entity
weak relationship
Tables: min 2 Tables
APPLIED COURSE



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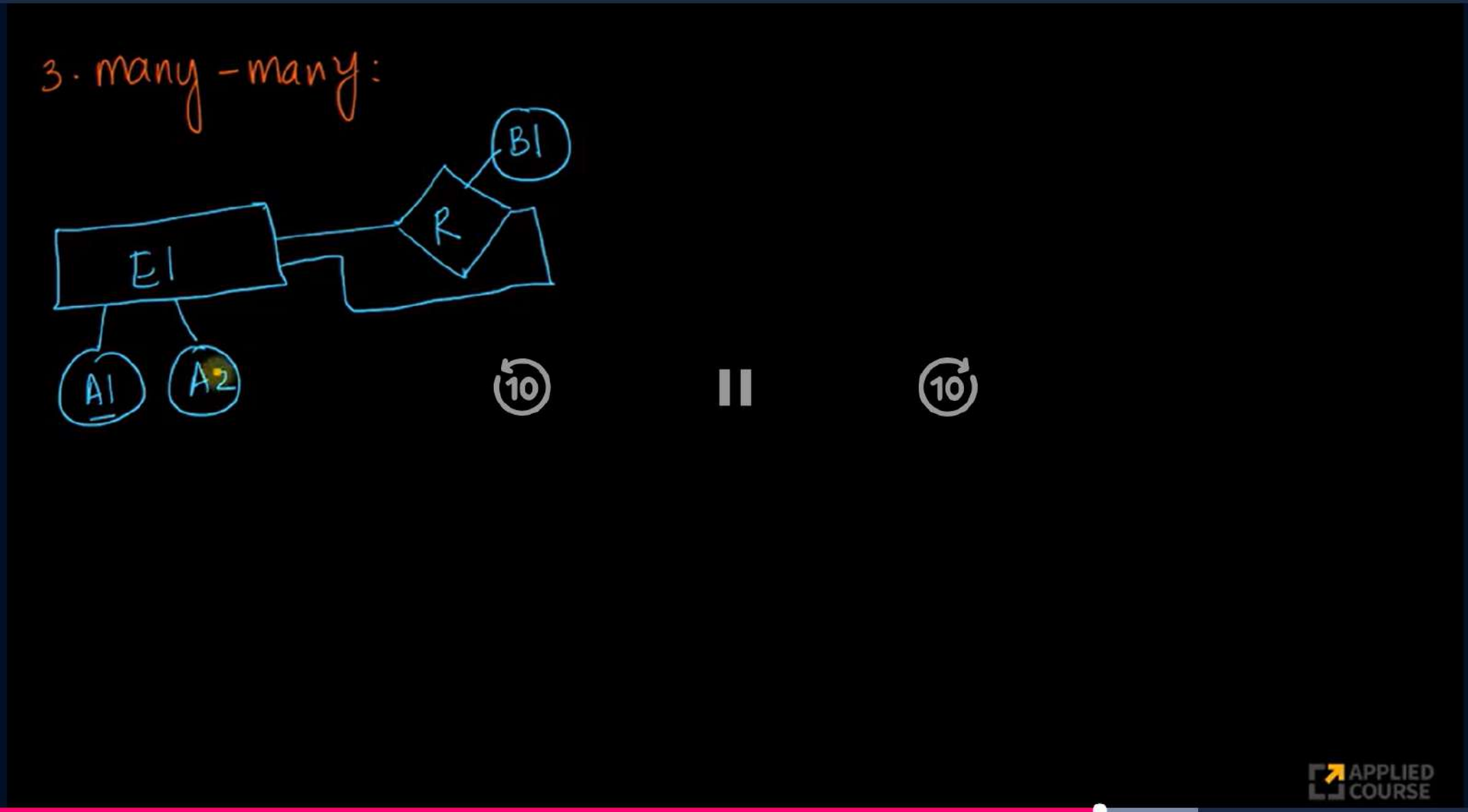
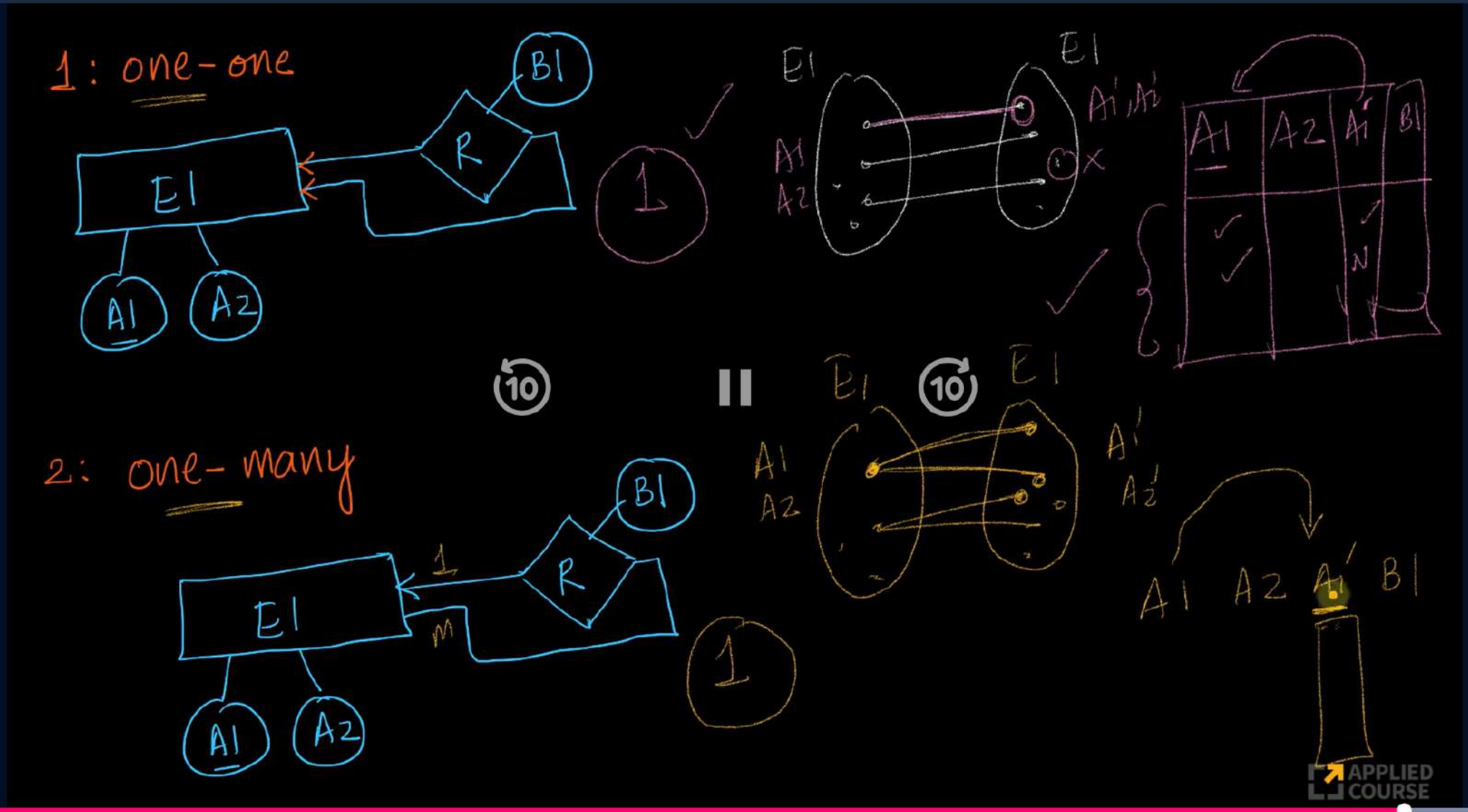
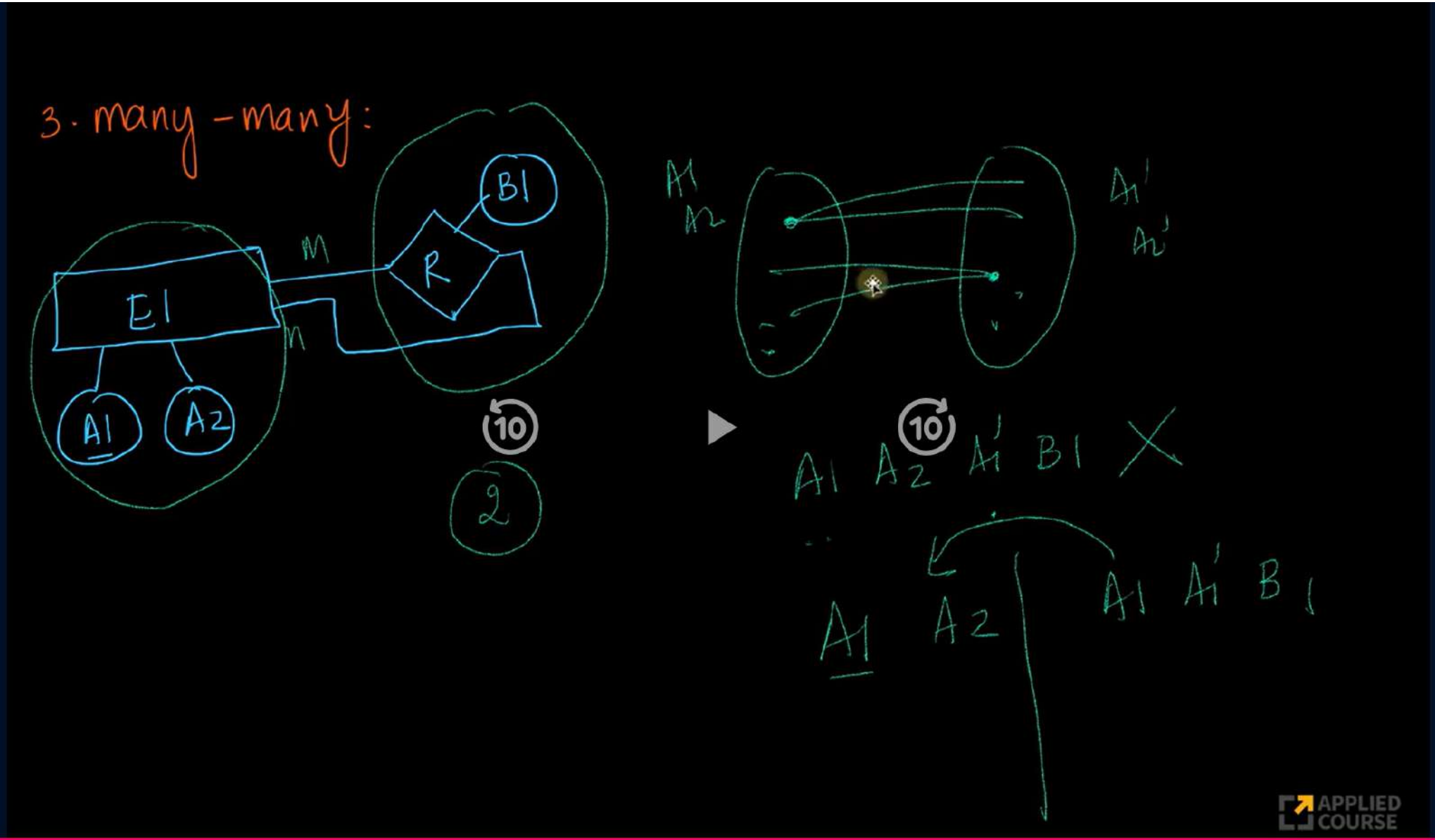

3. many - many:
B1
R
E1
A1
A2
10
10
APPLIED COURSE


1 : one - one
E1
R
B1
A1
A2
1
E1
E1
A1
A2
A1 A1'
A1
A2
A1
A2
A1'
B1
N
10
10
2 : one - many
E1
R
B1
1
M
A1
A2
1
E1
E1
A1
A2
A1'
A2'
A1
A2
A1'
B1
APPLIED COURSE

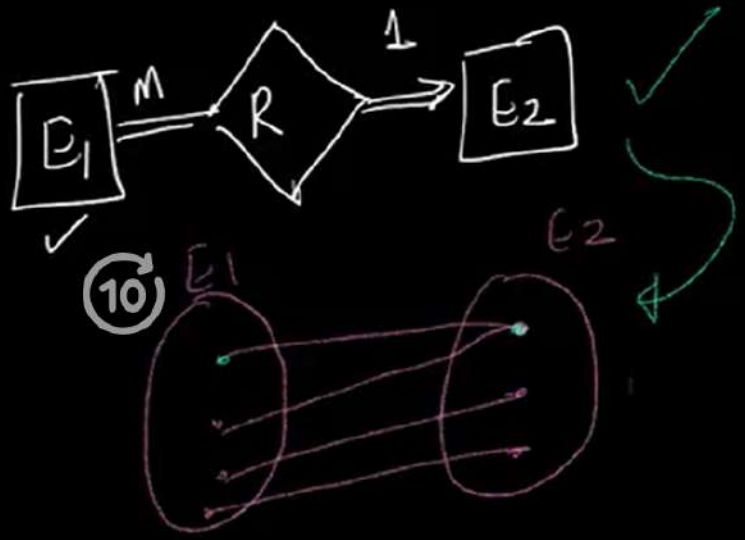


APPLIED COURSE

In an Entity-Relationship (ER) model, suppose R is a many-to-one relationship from entity set E1 to entity set E2. Assume that E1 and E2 participate totally in R and that the cardinality of E1 is greater than the cardinality of E2.

Which one of the following is true about R?

a. Every entity in E1 is associated with exactly one entity in E2.
b. Some entity in E1 is associated with more than one entity in E2.
c. Every entity in E2 is associated with exactly one entity in E1.
d. Every entity in E2 is associated with at most one entity in E1.

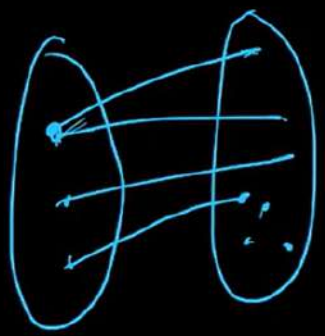


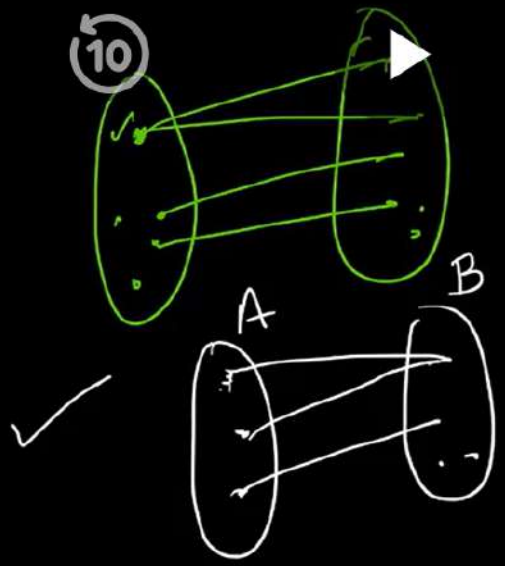
A

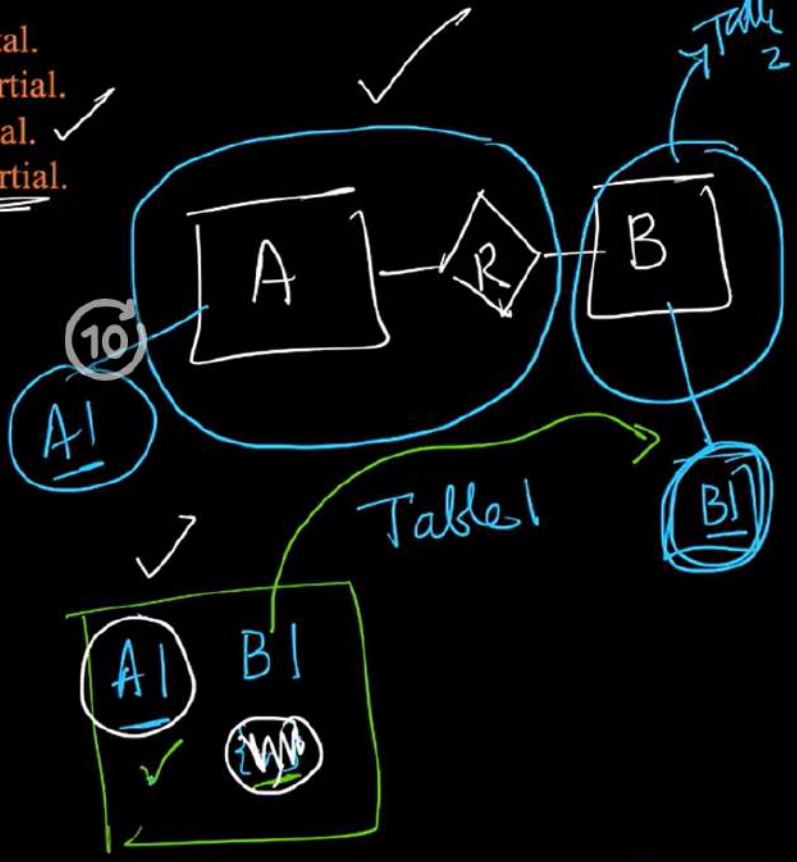
APPLIED COURSE

An ER model of a database consists of entity types A and B. These are connected by a relationship R which does not have its own attribute. Under which of the following conditions, can the relational table for R be merged with that of A?

(A) Relation R is one-to-many and the participation of A in R is total.
(B) Relation R is one-to-many and the participation of A in R is partial.
(C) Relation R is many-to-one and the participation of A in R is total.
(D) Relation R is many-to-one and the participation of A in R is partial.







APPLIED COURSE

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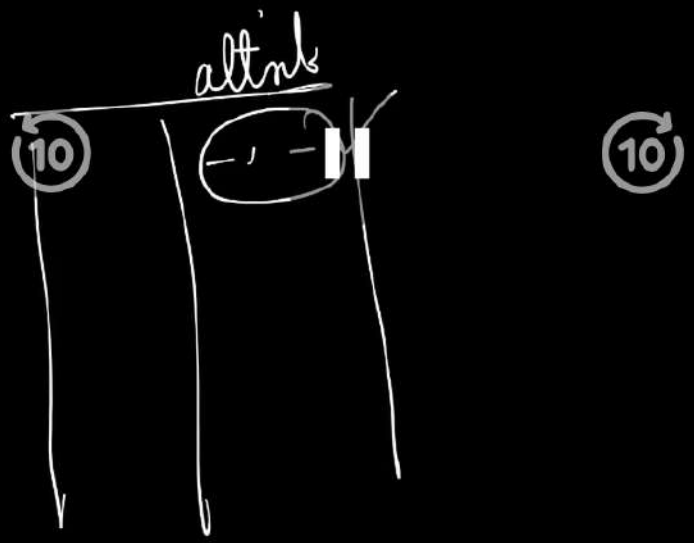
Given the basic ER and relational models, which of the following is INCORRECT?

(A) An attribute of an entity can have more than one value

(B) An attribute of an entity can be composite

(C) In a row of a relational table, an attribute can have more than one value

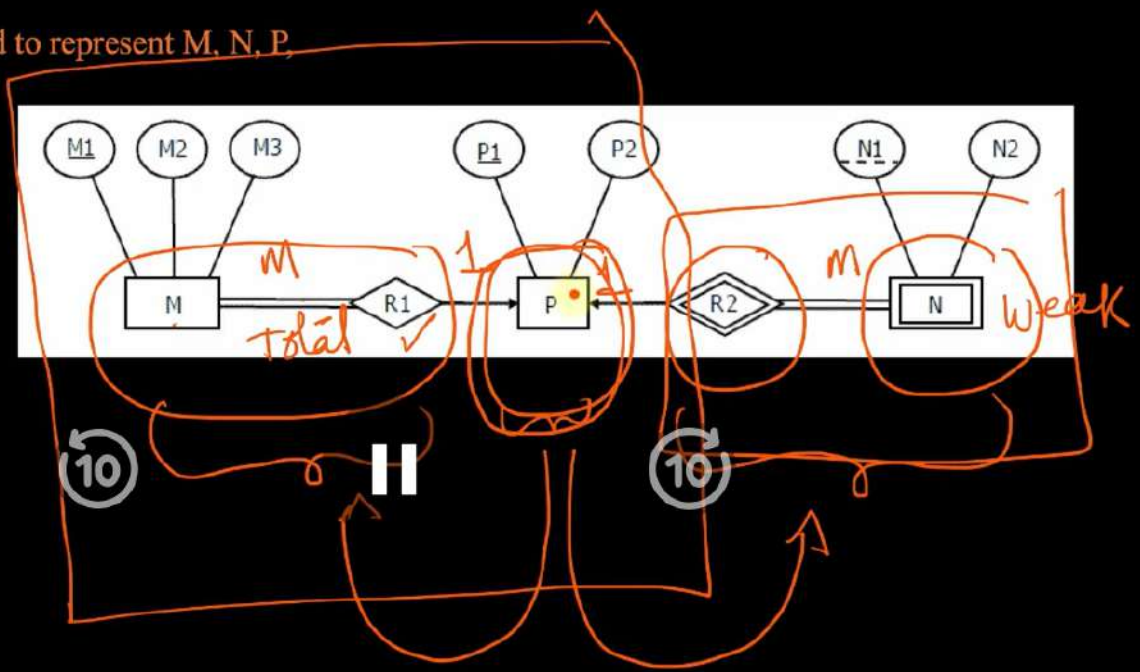
(D) In a row of a relational table, an attribute can have exactly one value or a NULL value



APPLIED COURSE

The minimum number of tables needed to represent M, N, P, R1, R2 is

(A) 2
(B) 3
(C) 4
(D) 5

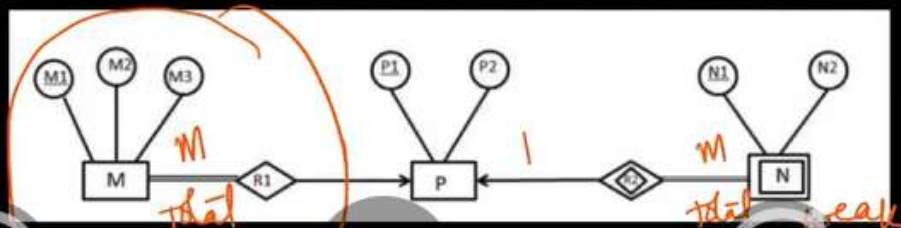


APPLIED COURSE

Consider the following ER diagram

Which of the following is a correct attribute set for one of the tables for the minimum number of tables needed to represent M, N, P, R1, R2?

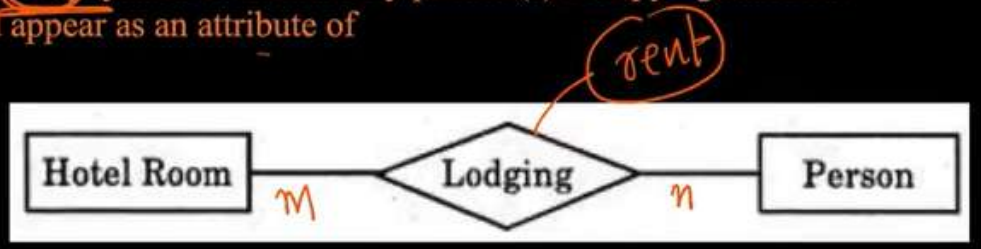
1.M1,M2,M3,P1
2.M1,P1,N1,N2
3.M1,P1,N1
4.M1,P1



APPLIED COURSE

Consider the entities 'hotel room', and 'person' with a many to many relationship 'lodging' as shown below
If we wish to store information about the rent payment to be made by person (s) occupying different hotel rooms, then this information should appear as an attribute of

1. Person
2. Hotel Room
3. Lodging
4. None of these



APPLIED