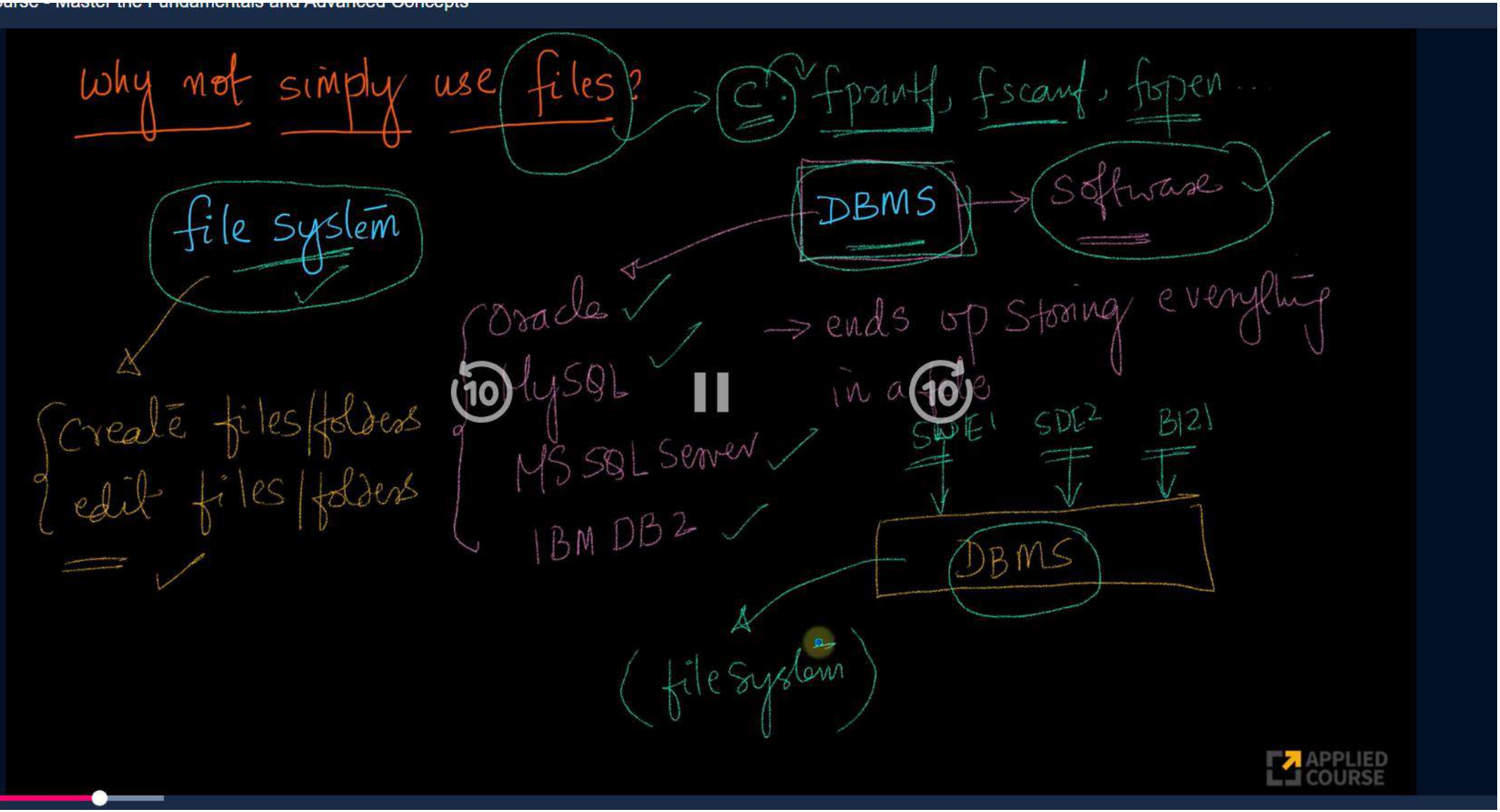
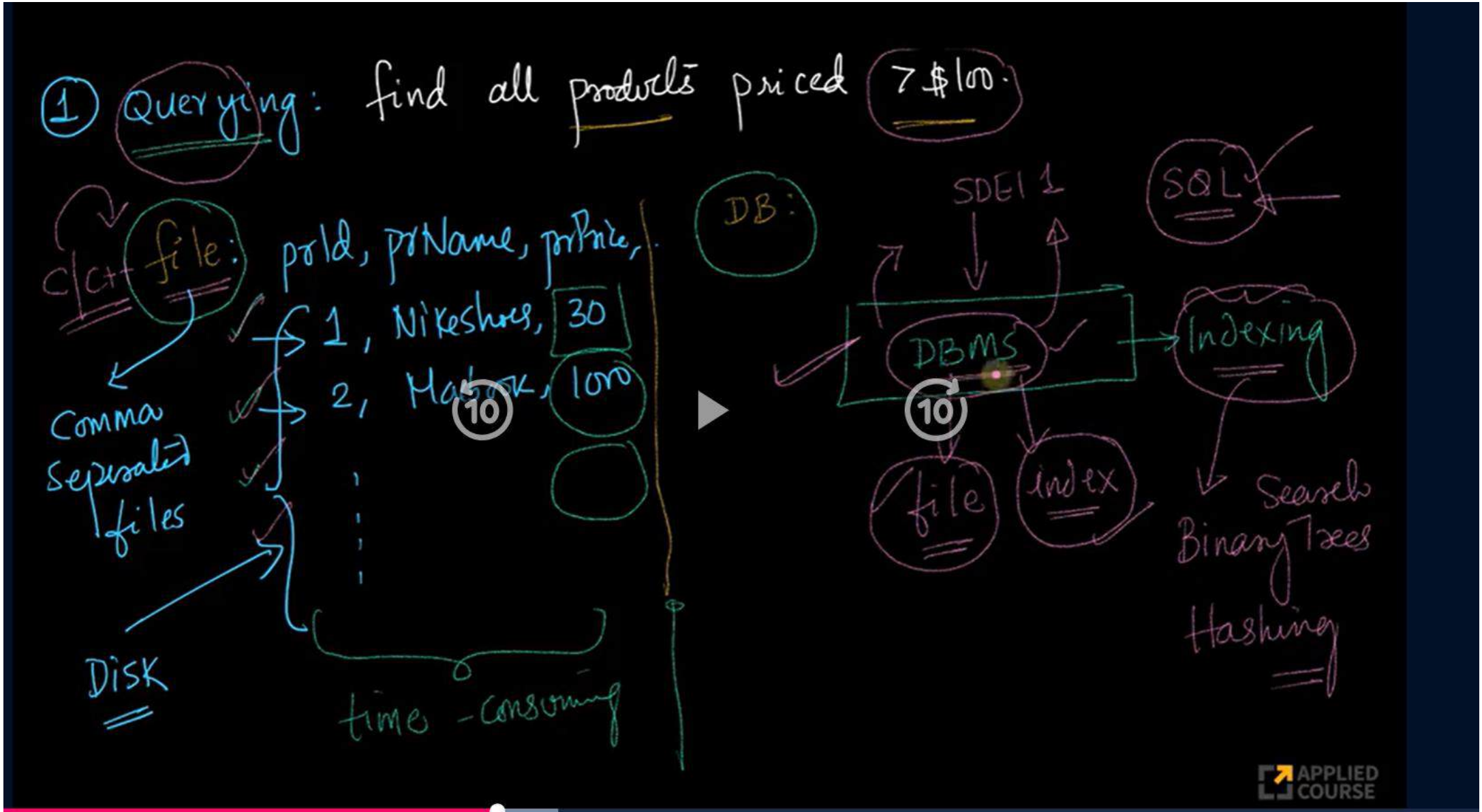
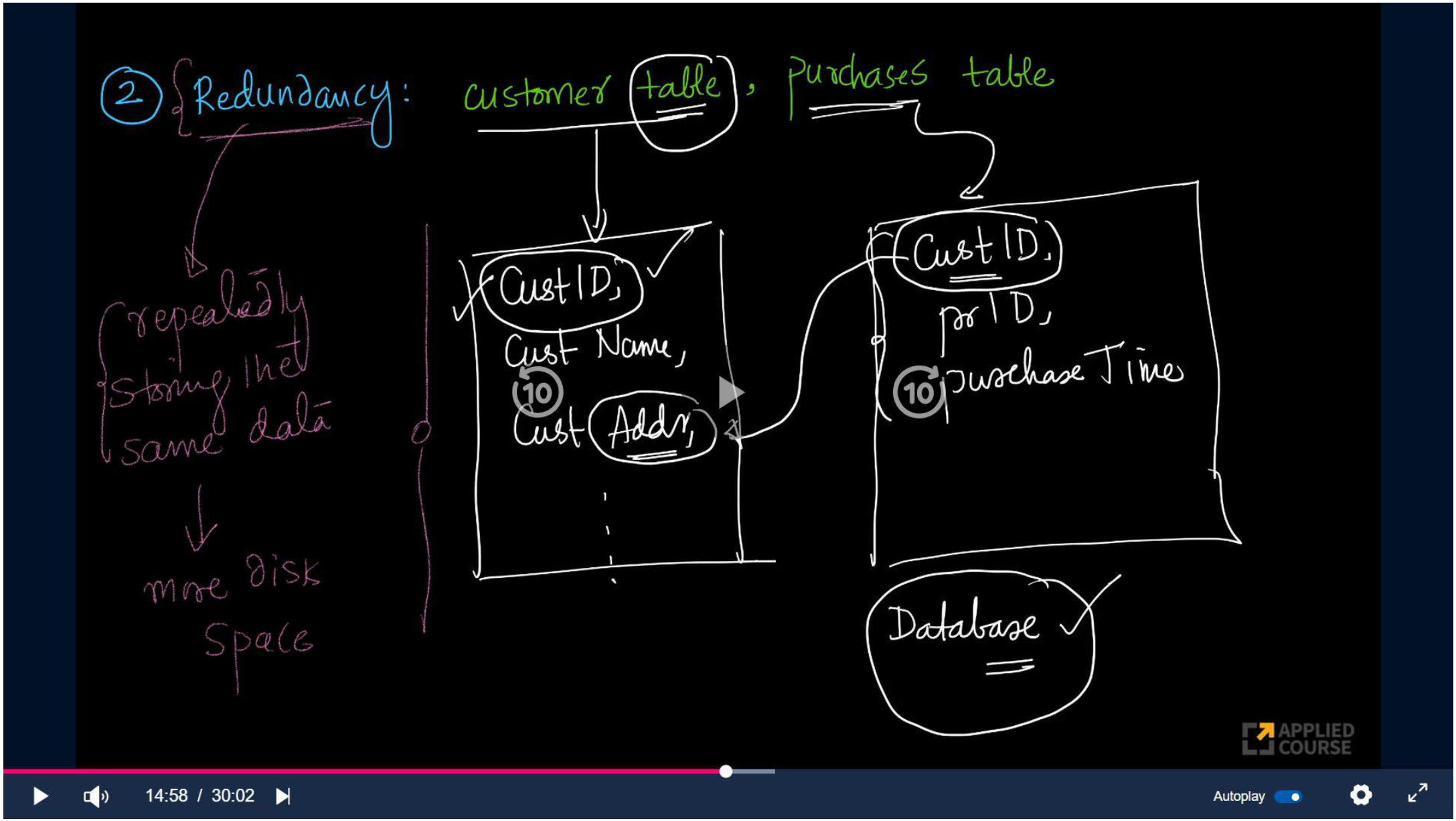
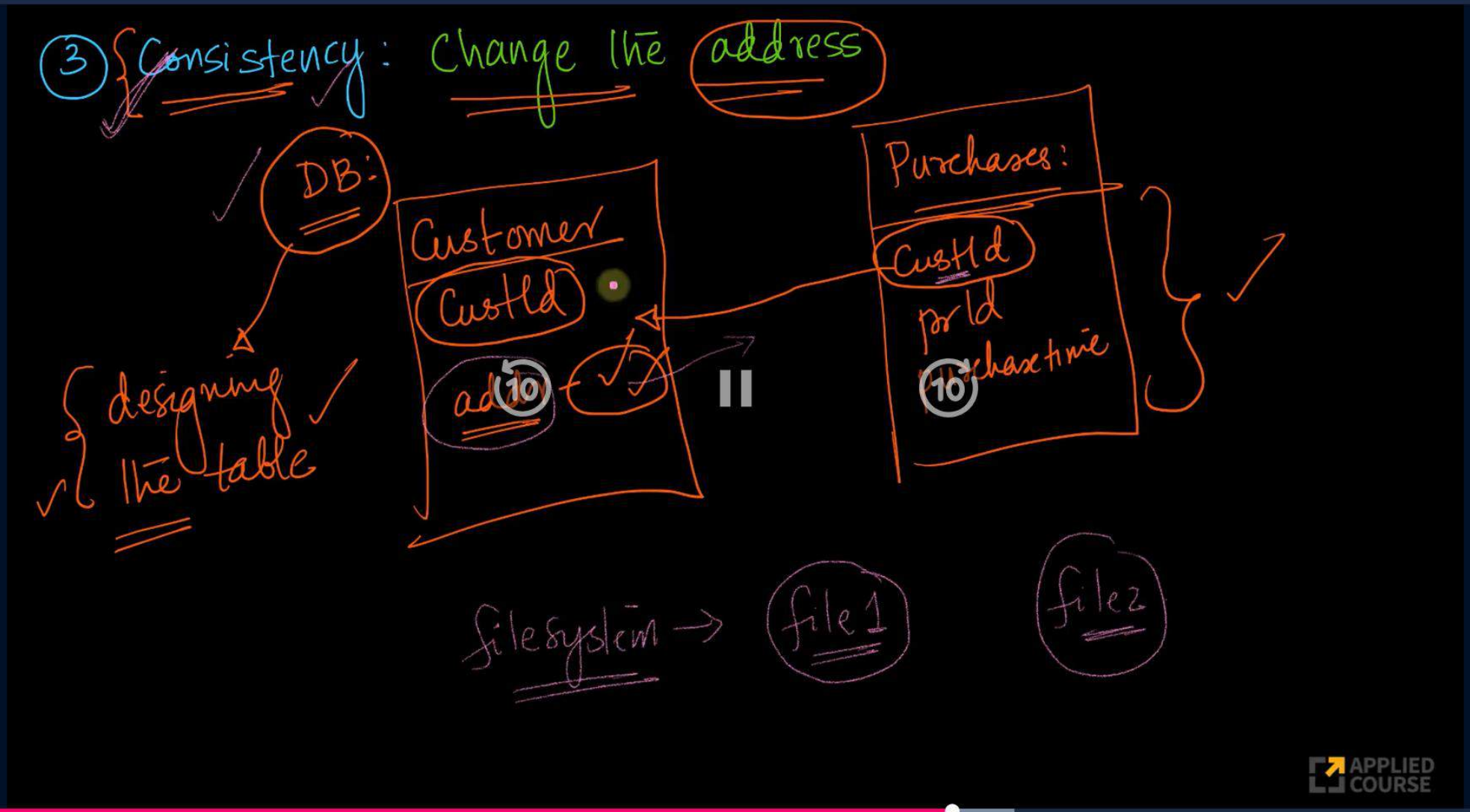


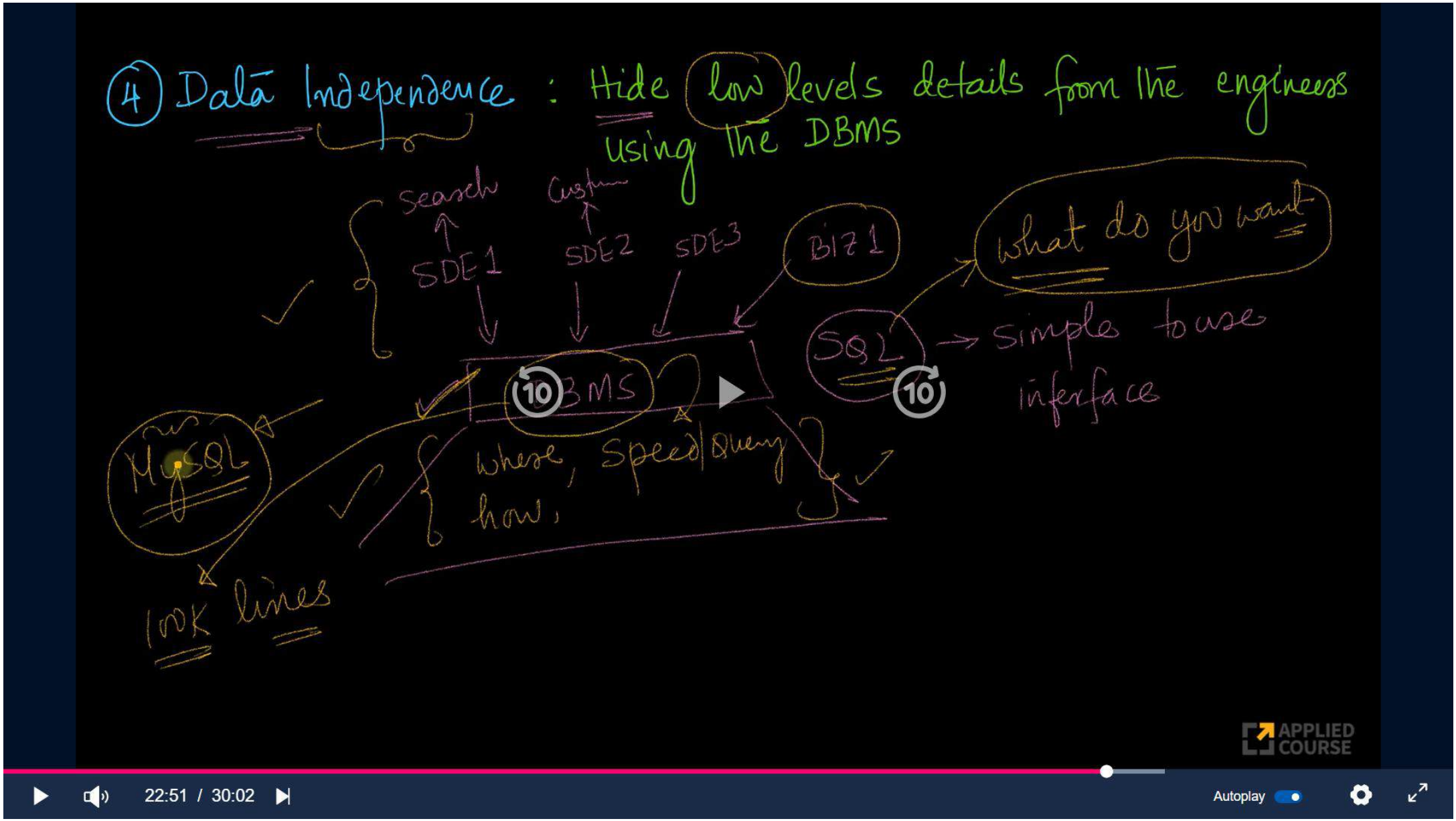
APPLIED COURSE

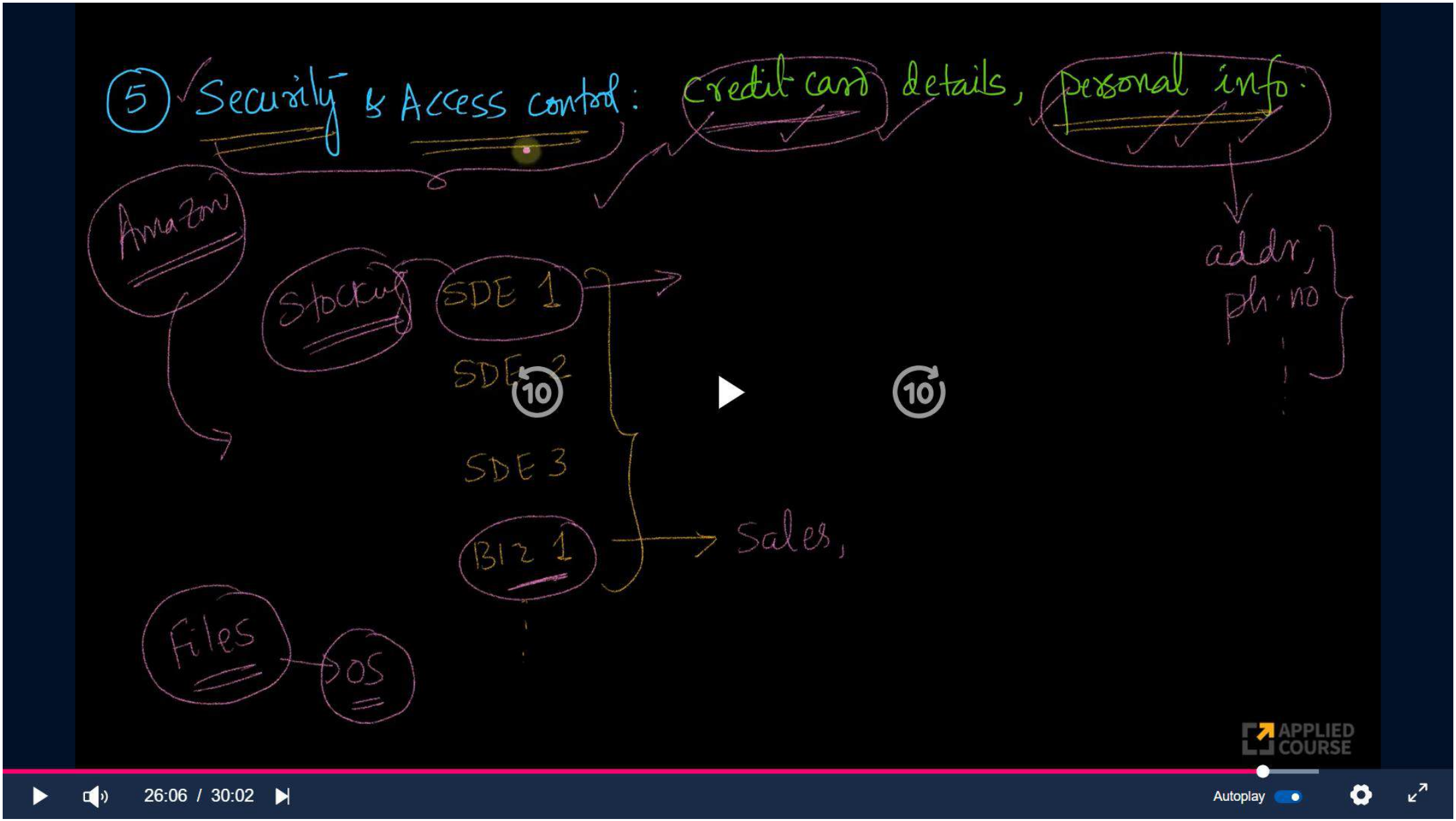

1 Querying: find all products priced 7$100.
c/c++ file:
prId, prName, prPrice,
1, Nikeshoes, 30
2, Mask, 100
Comma separated files
DISK
time-consuming
DB:
SDE/1
DBMS
10
file
index
SQL
Indexing
Search Binary Trees
Hashing
APPLIED COURSE

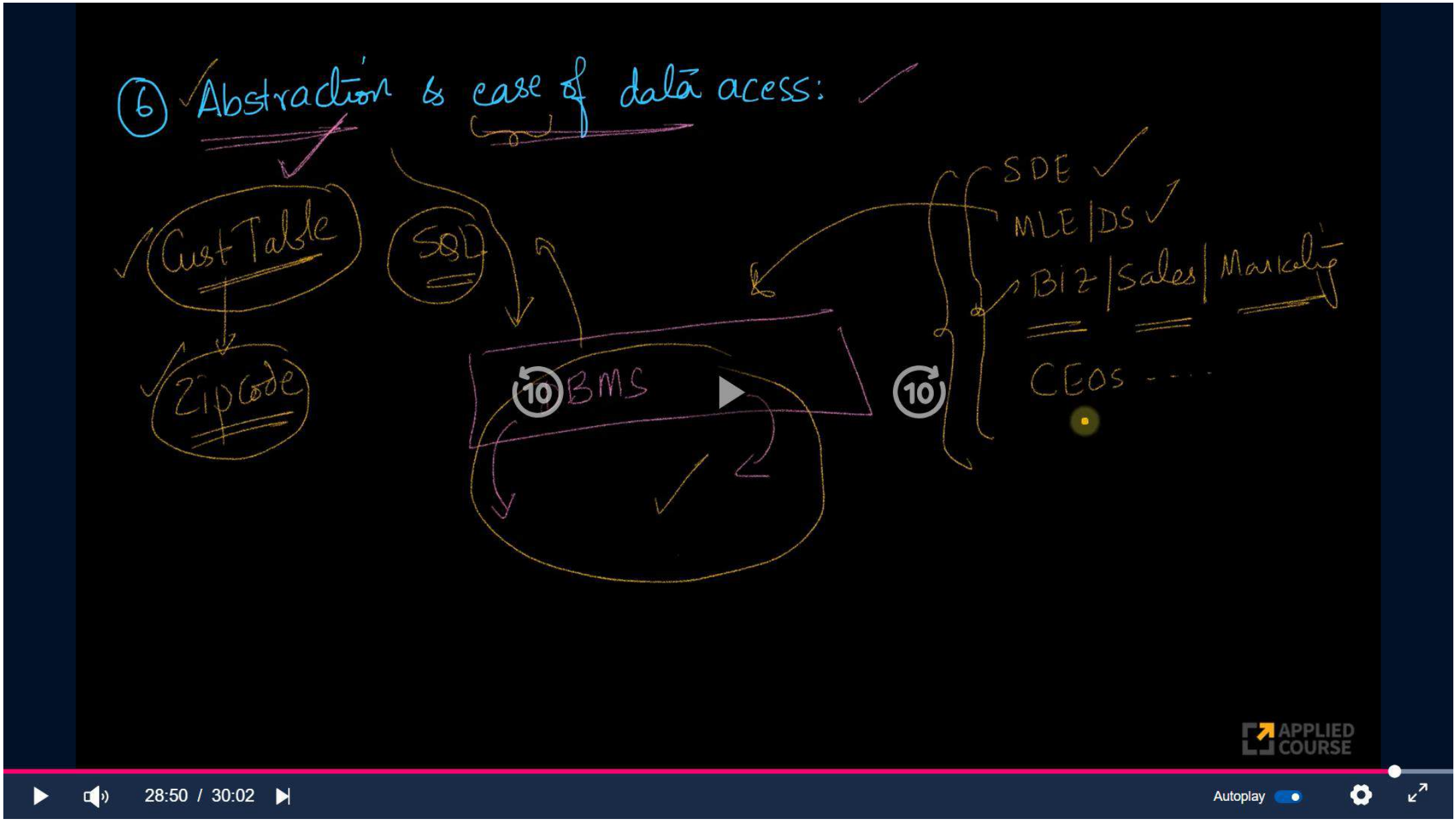


14:58 / 30:02
Autoplay


3 Consistency : Change the address
DB:
designing the table
Customer
CustId
addr
Purchases:
CustId
prId
10
filesystem
file1
file2
APPLIED COURSE


4 Data Independence : Hide low levels details from the engineers using the DBMS
search
Custom
SDE 1
SDE 2
SDE 3
Biz 1
what do you want
SQL
simple to use interface
DBMS
where, Speed Query how,
MySQL
100K lines
APPLIED COURSE
22:51 / 30:02
Autoplay


5 Security & Access control:
credit card details,
personal info.
Amazon
Stocks
SDE 1
SDE 2
SDE 3
addr,
ph. no
10
10
Biz 1
Sales,
Files
OS
APPLIED COURSE
26:06 / 30:02
Autoplay


6 Abstraction & ease of data access:
Cust Table
SQL
Zipcode
BMS
10
10
SDE
MLE | DS
BI | Sales | Marketing
CEOs ....
APPLIED COURSE
28:50 / 30:02
Autoplay


✓ Tables, Keys & Schema
Relational Databases:
Relation = Table
10
Table = set of rows & columns
Terminology ✓
✓ Graph Databases
Relational Algebra
10
set theory
APPLIED COURSE
2:07 / 34:41
Autoplay

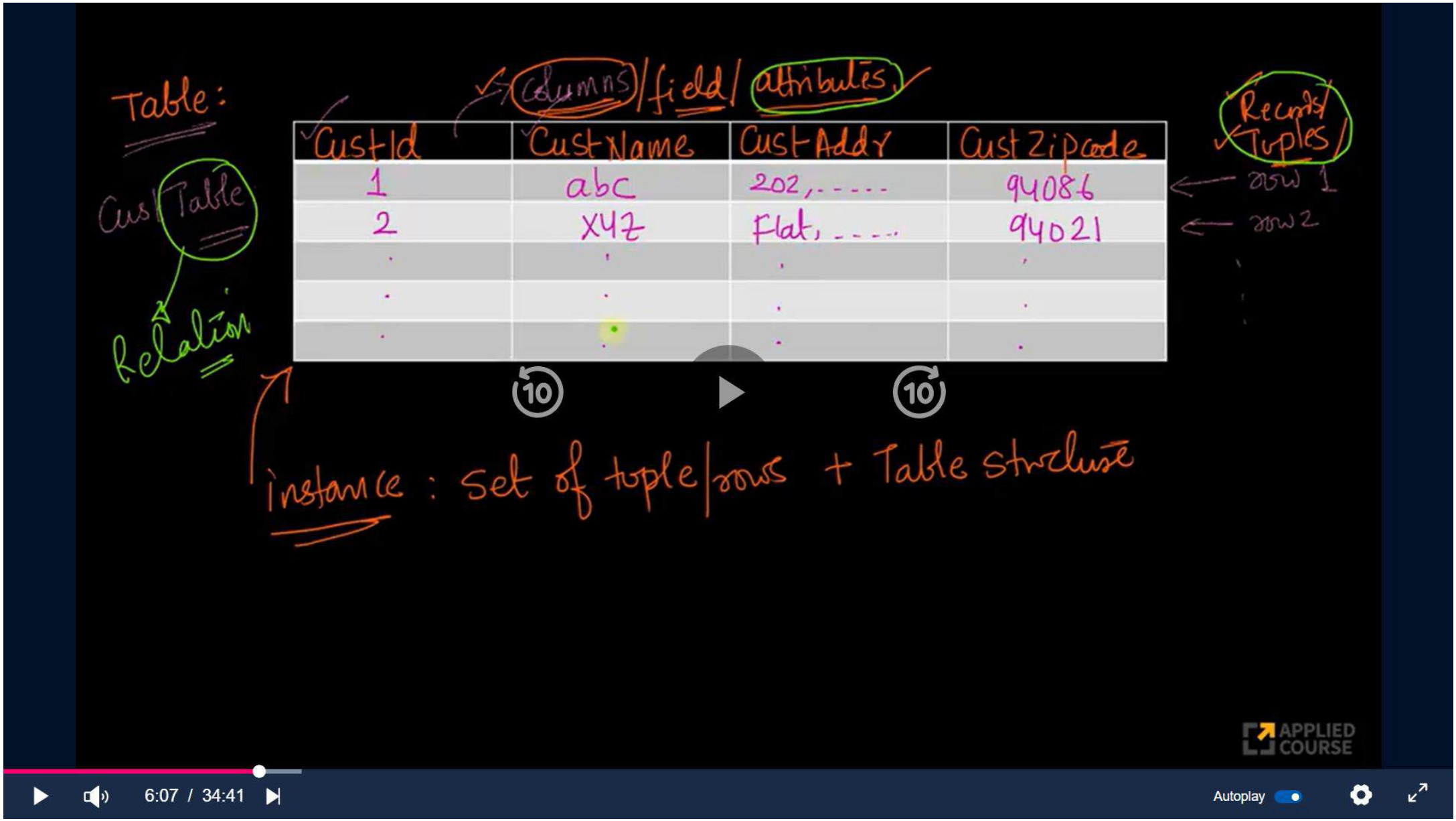
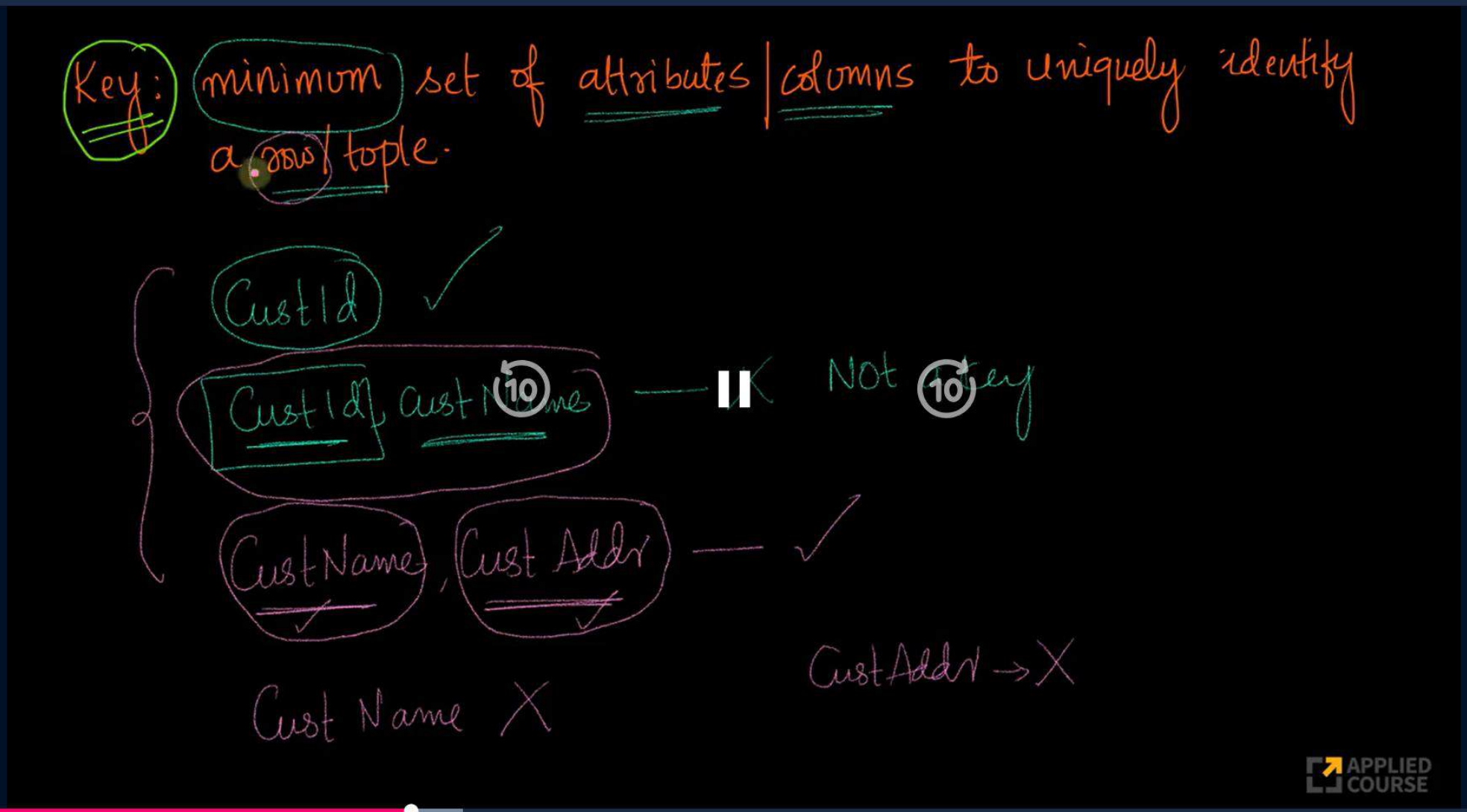
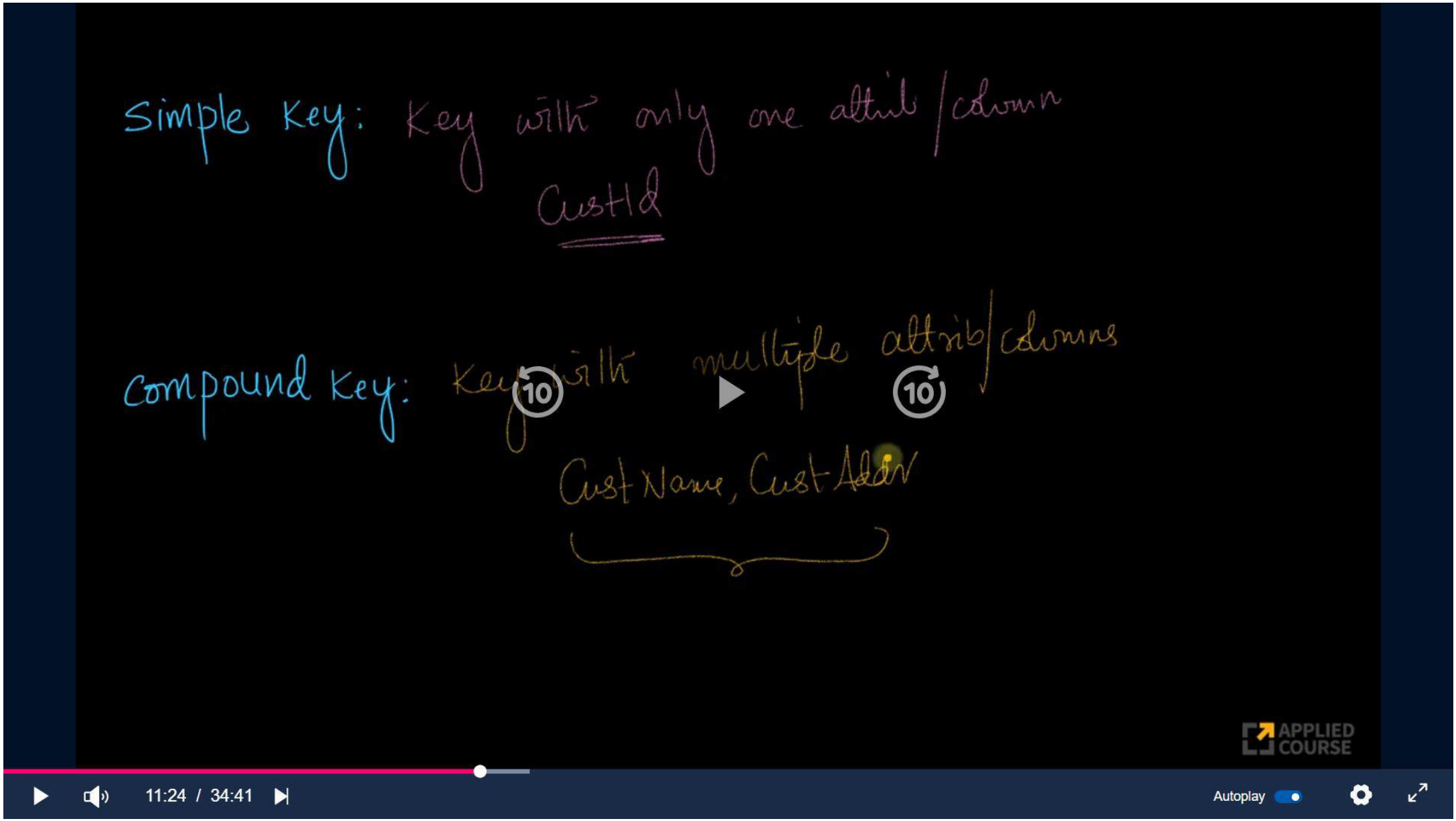
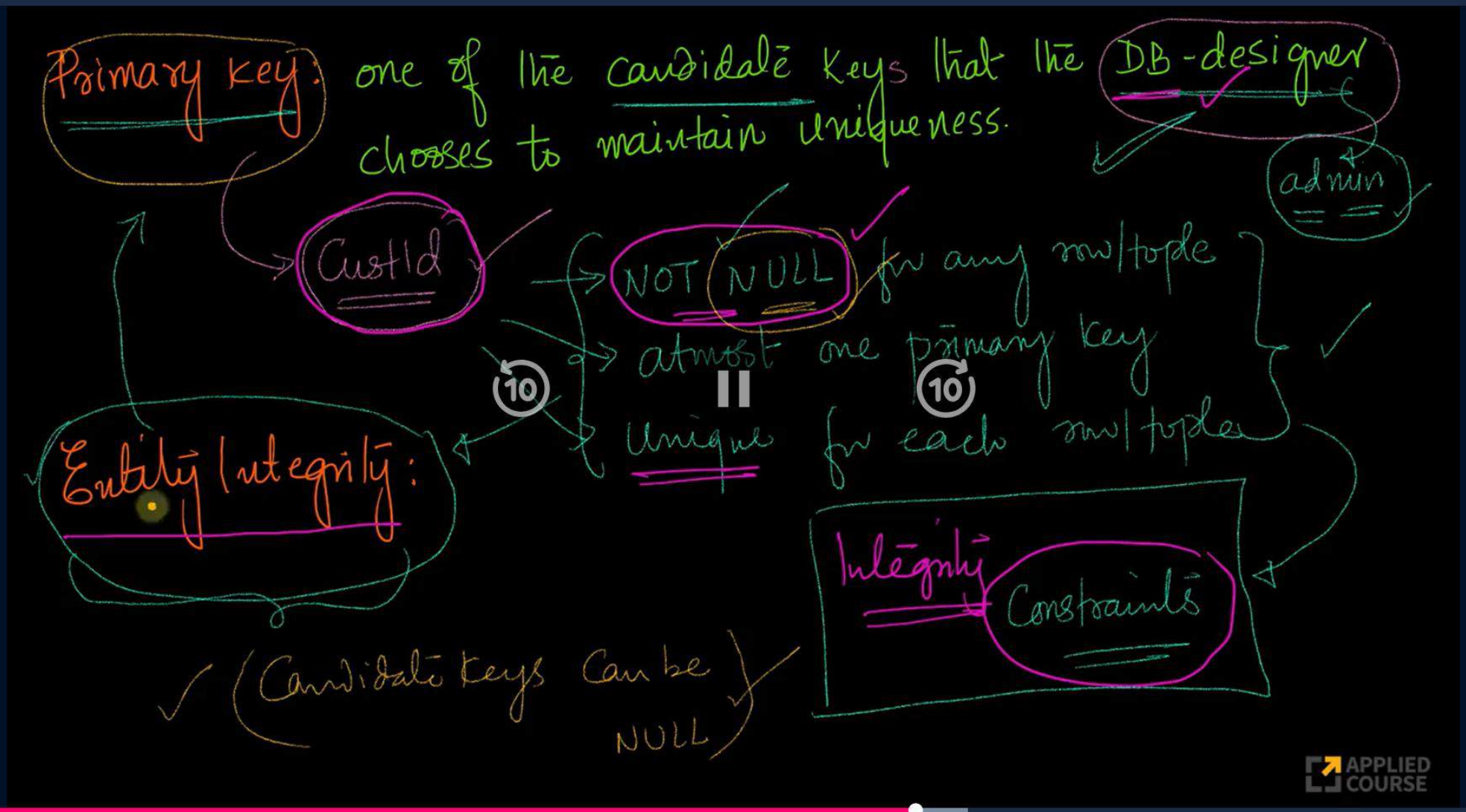


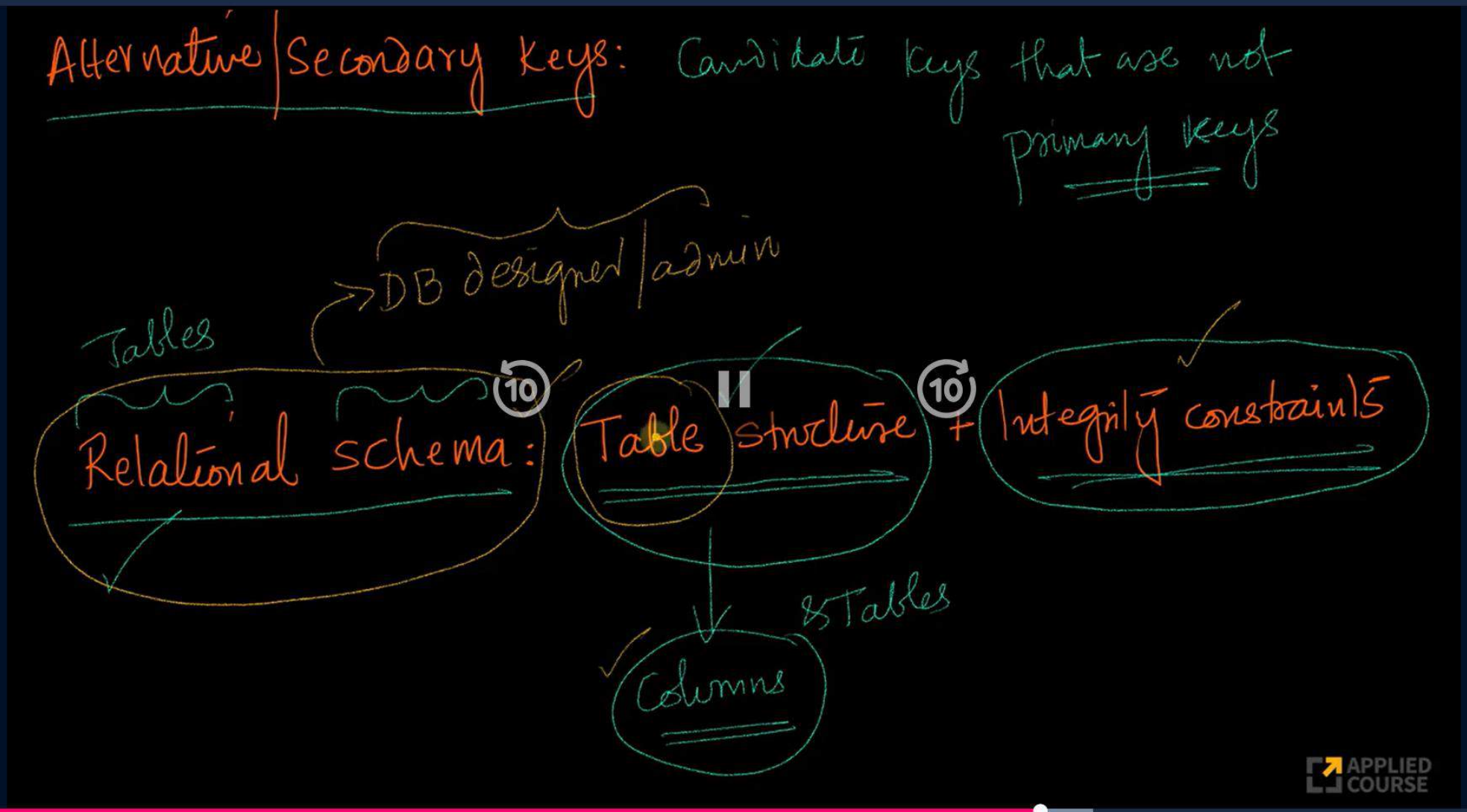
Table:
Cust Table
Relation
Columns / field / attributes
Records / Tuples
CustId
CustName
CustAddr
CustZipcode
1
abc
202, ...
94086
2
XYZ
Flat, ...
94021
row 1
row 2
10
10
instance : set of tuple/rows + Table structure
APPLIED COURSE
6:07 / 34:41
Autoplay

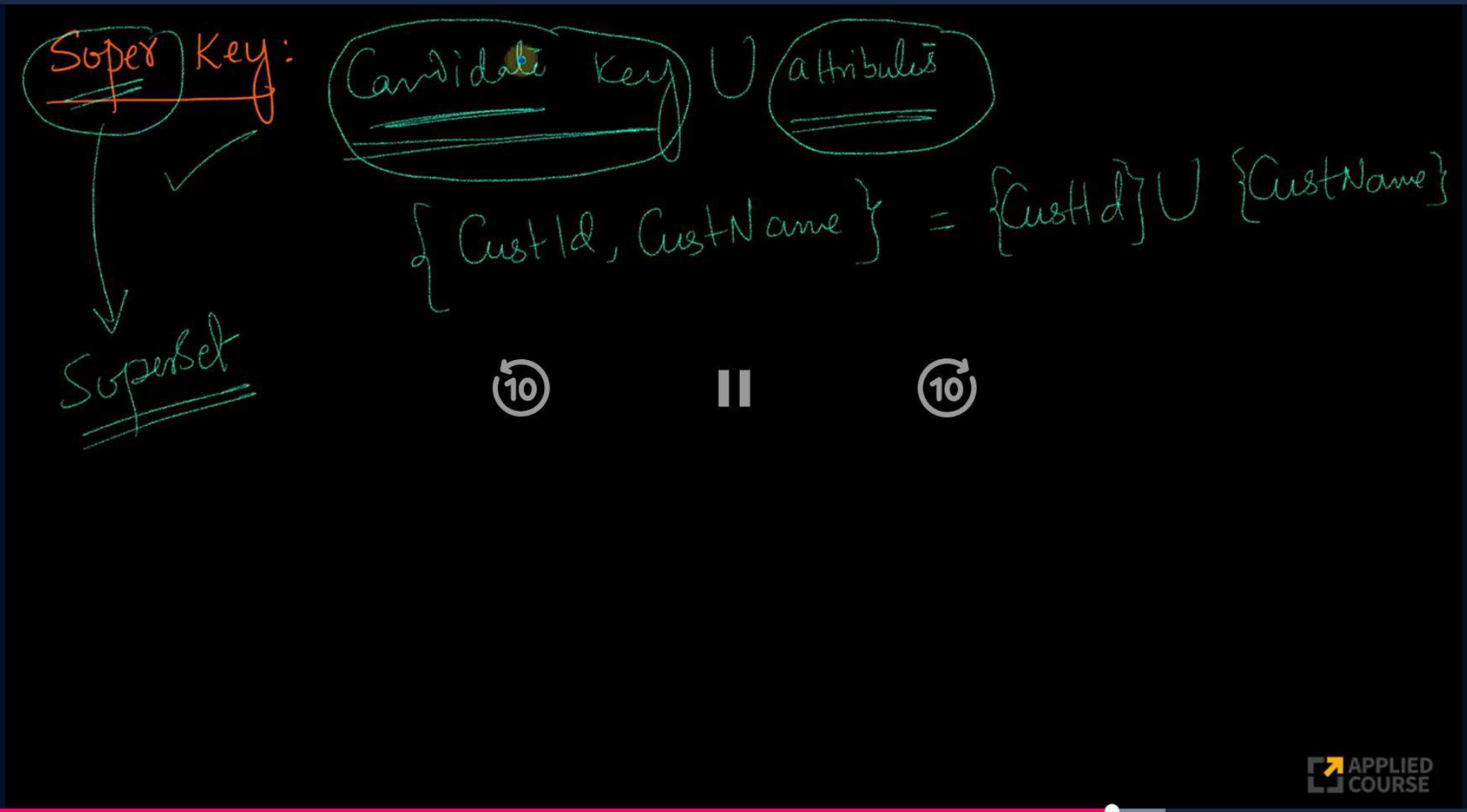

Key: minimum set of attributes | columns to uniquely identify a row | tuple.
CustId ✓
CustId, CustName — X Not Key
CustName, CustAddr — ✓
CustName X
CustAddr → X
APPLIED COURSE

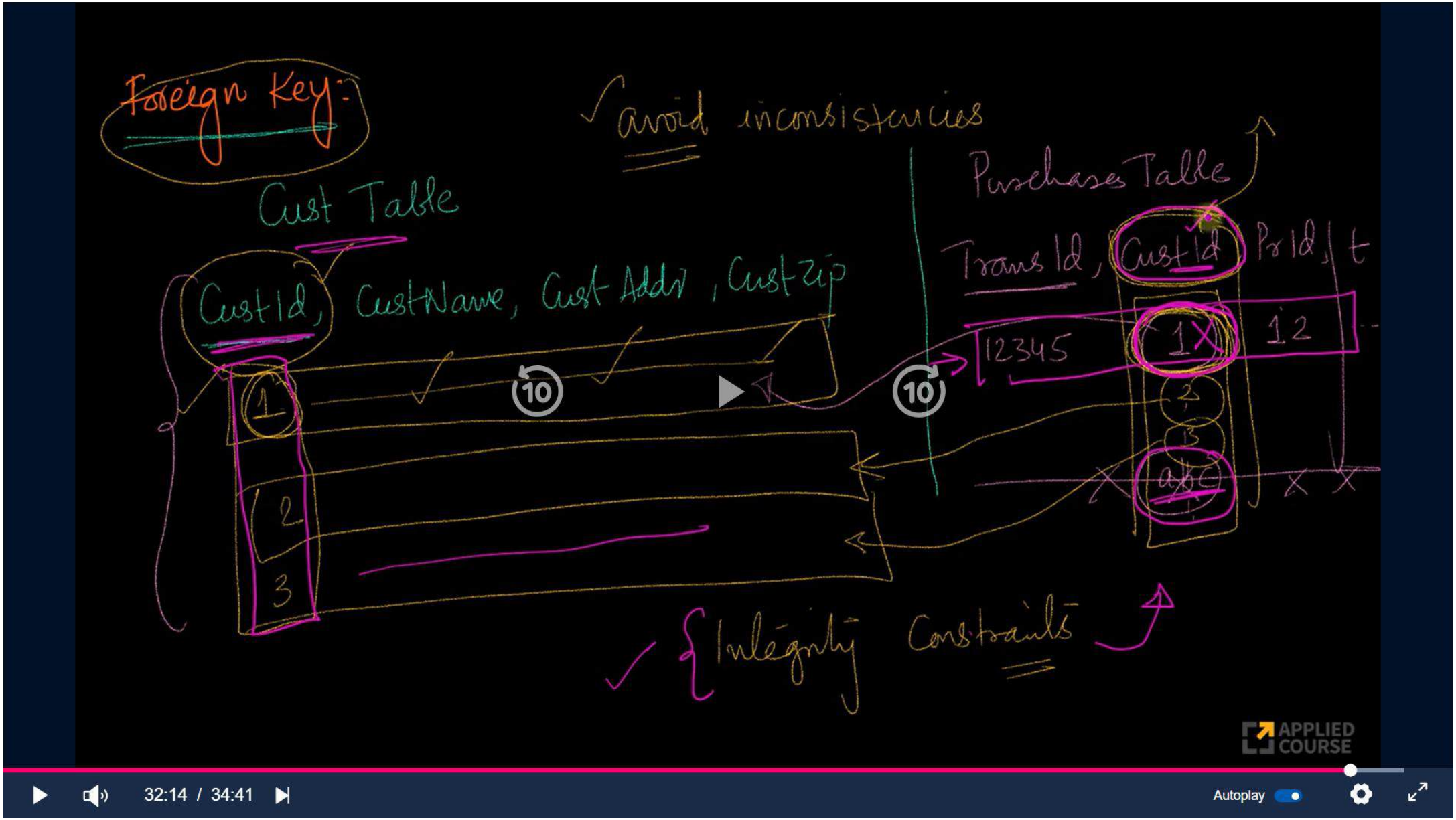

Simple Key: Key with only one attrib/column
CustId
Compound Key: Key with multiple attrib/columns
CustName, CustAddr
APPLIED COURSE
11:24 / 34:41
Autoplay


Candidate Key: Set of all Unique Keys.
{CustId, {Cust Name, Cust Addr}}
10
10
APPLIED COURSE
13:31 / 34:41
Autoplay


Primary key: one of the candidate keys that the DB-designer chooses to maintain uniqueness.
admin
CustId
NOT NULL
for any row/tople
atmost one primary key
Unique for each row/tople
Entity Integrity:
Integrity Constraints
(Candidate keys can be NULL)
APPLIED COURSE

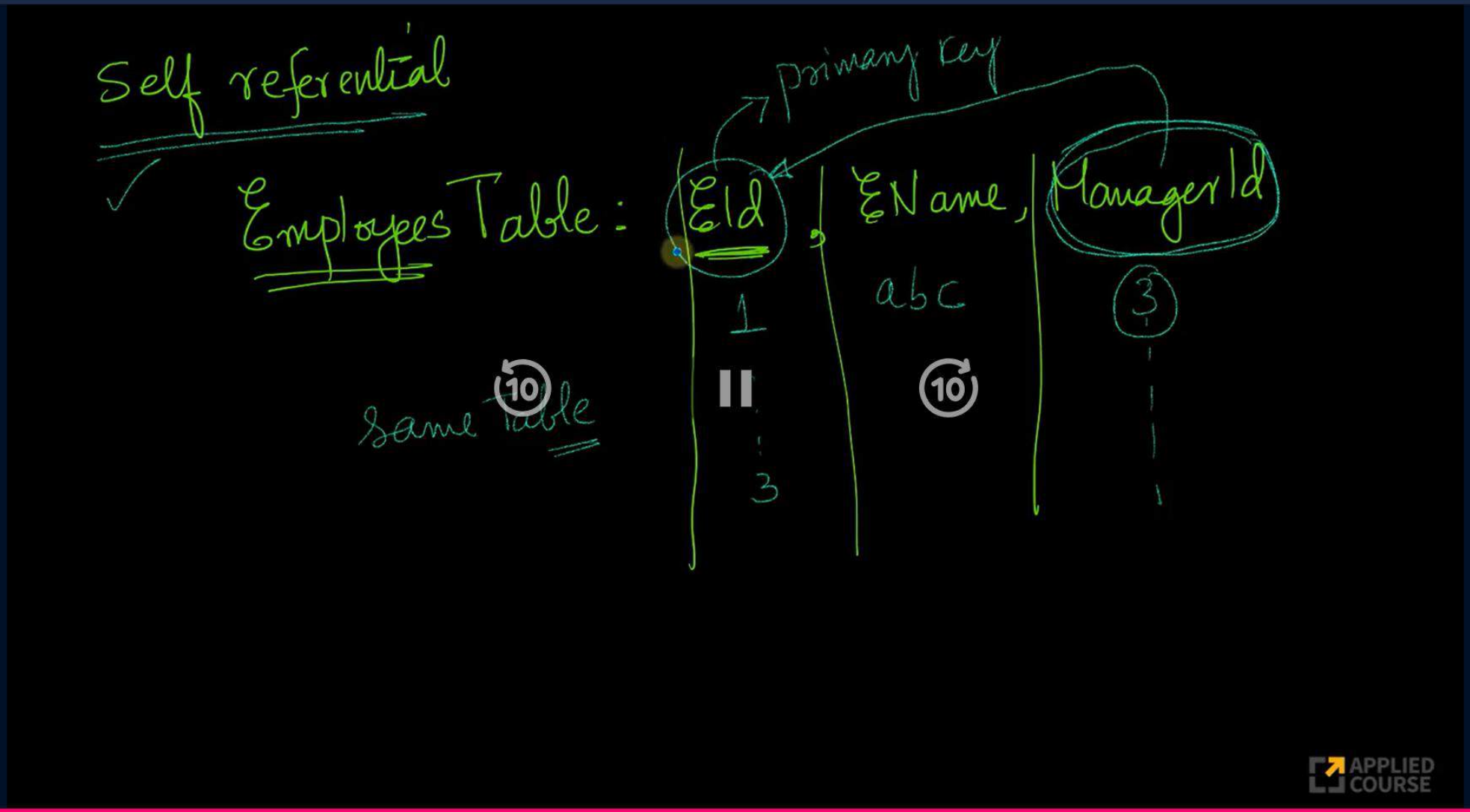

Alternative/Secondary Keys: Candidate keys that are not primary keys
DB designer/admin
Tables
Relational schema:
Table structure
Integrity constraints
Columns
& Tables
APPLIED COURSE

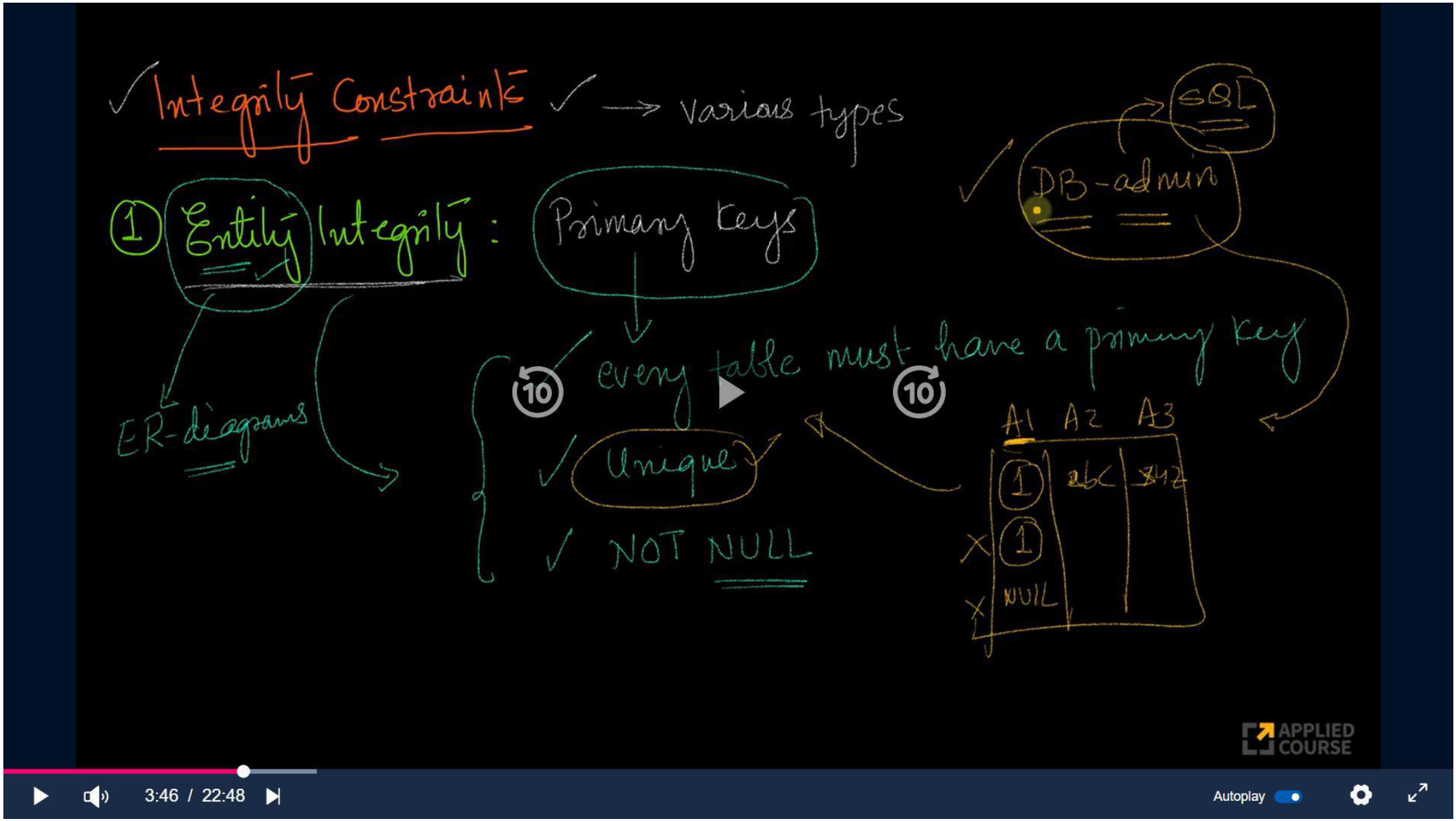

Super Key :
Candidate Key
U
attributes
{CustId, CustName} = {CustId} U {CustName}
Superset
10
10
APPLIED COURSE



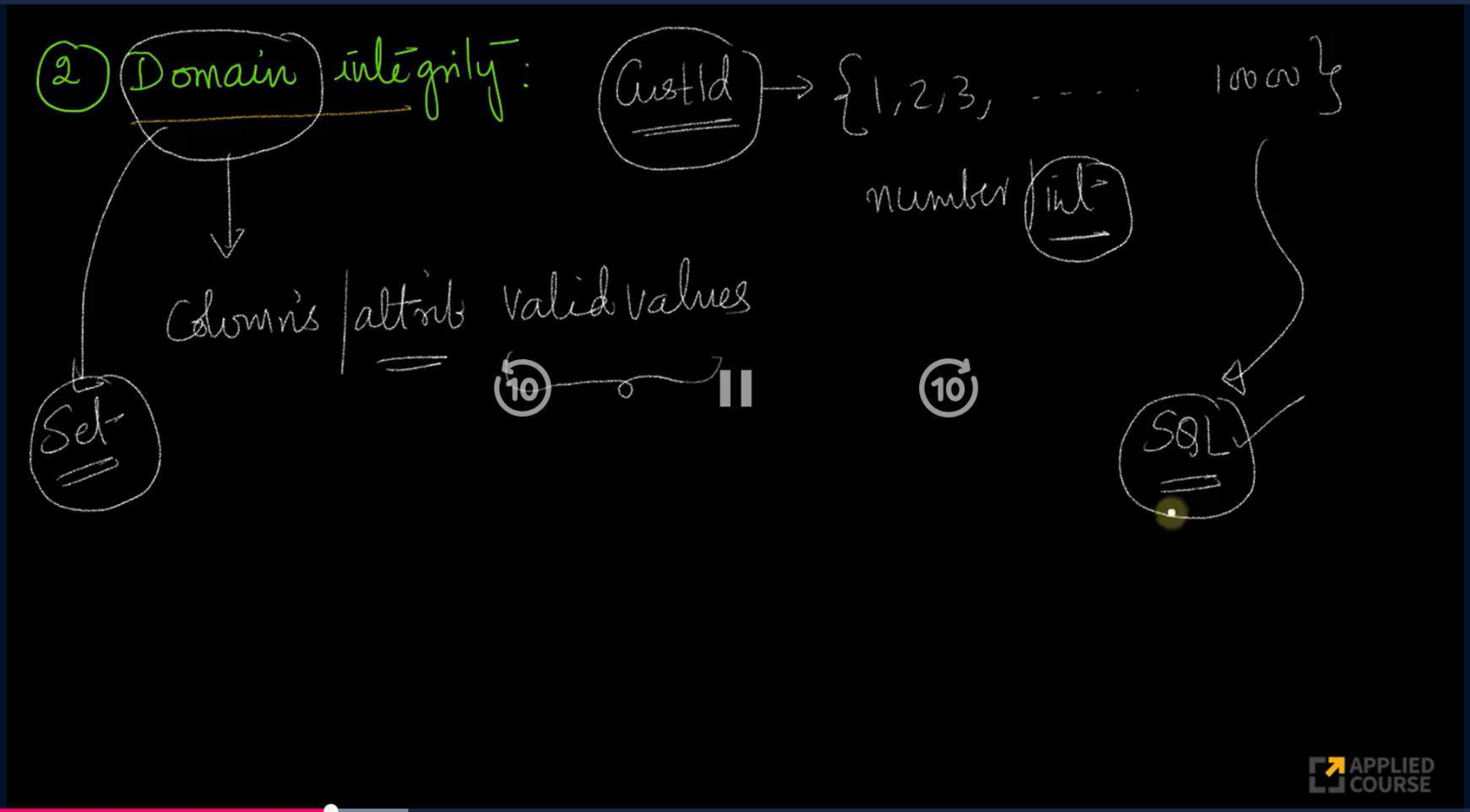
32:14 / 34:41

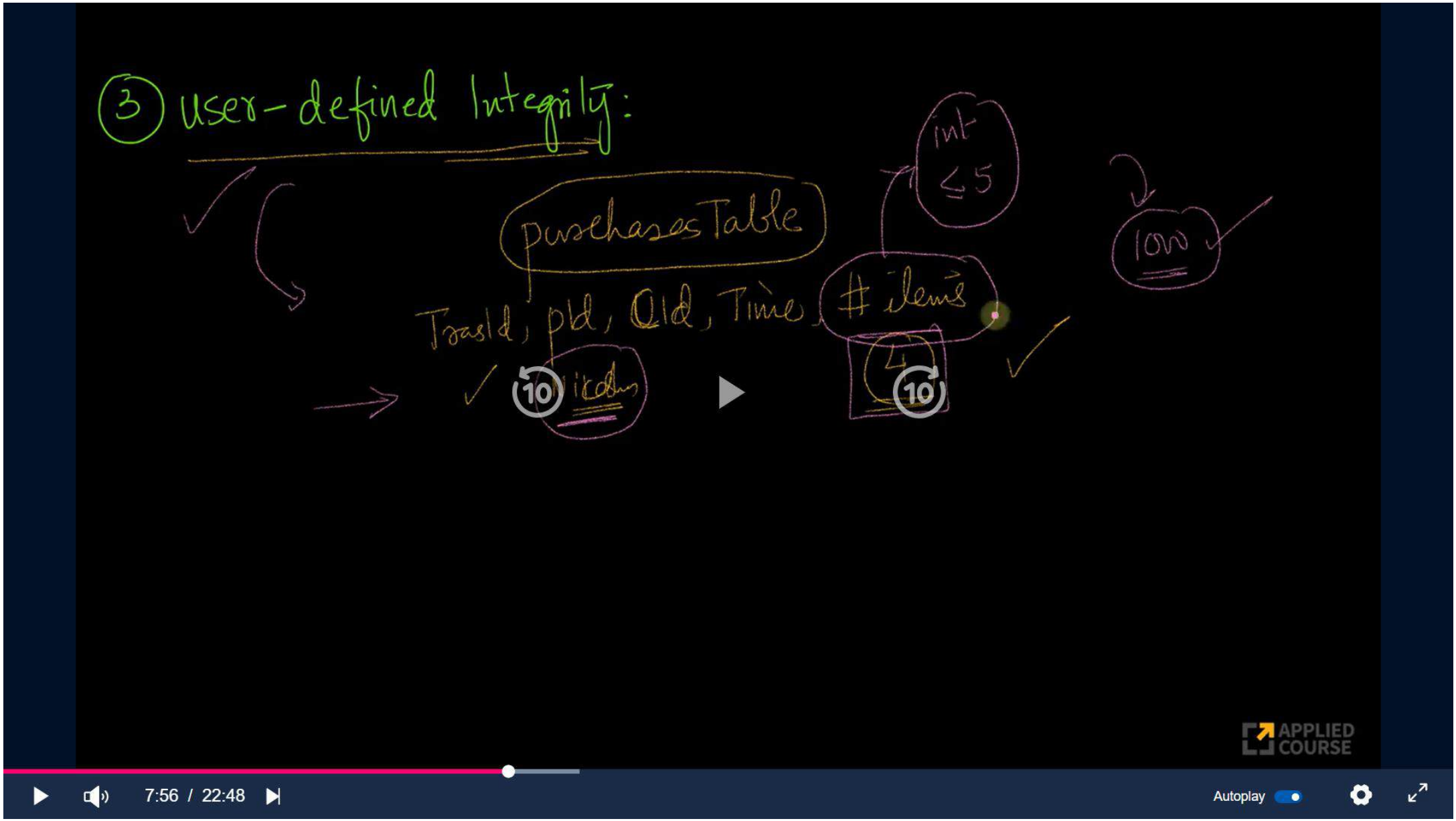
Autoplay

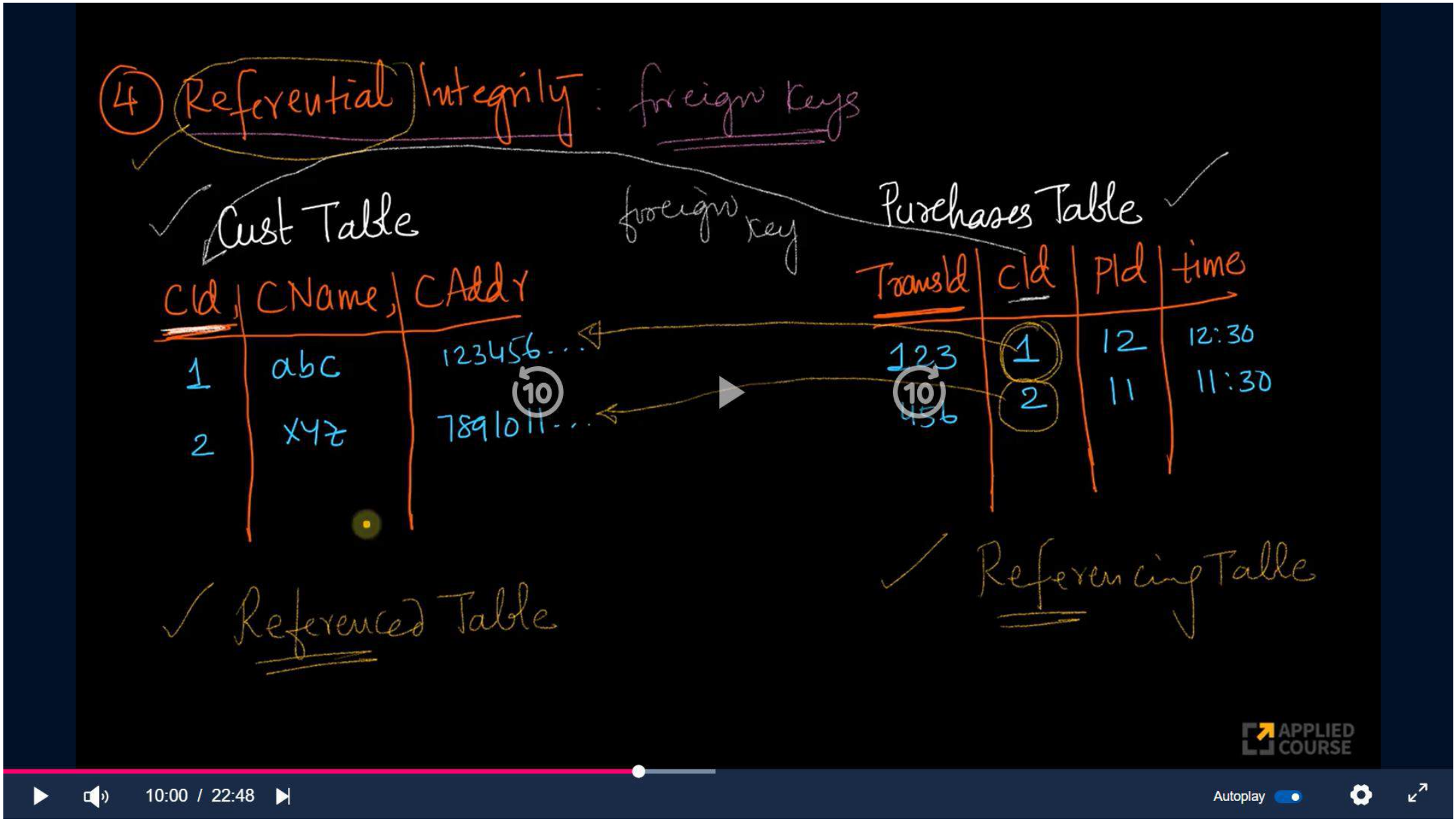

Self referential
Employees Table :
EId
primary key
EName
ManagerId
abc
1
3
3
10
10
Same Table
APPLIED COURSE

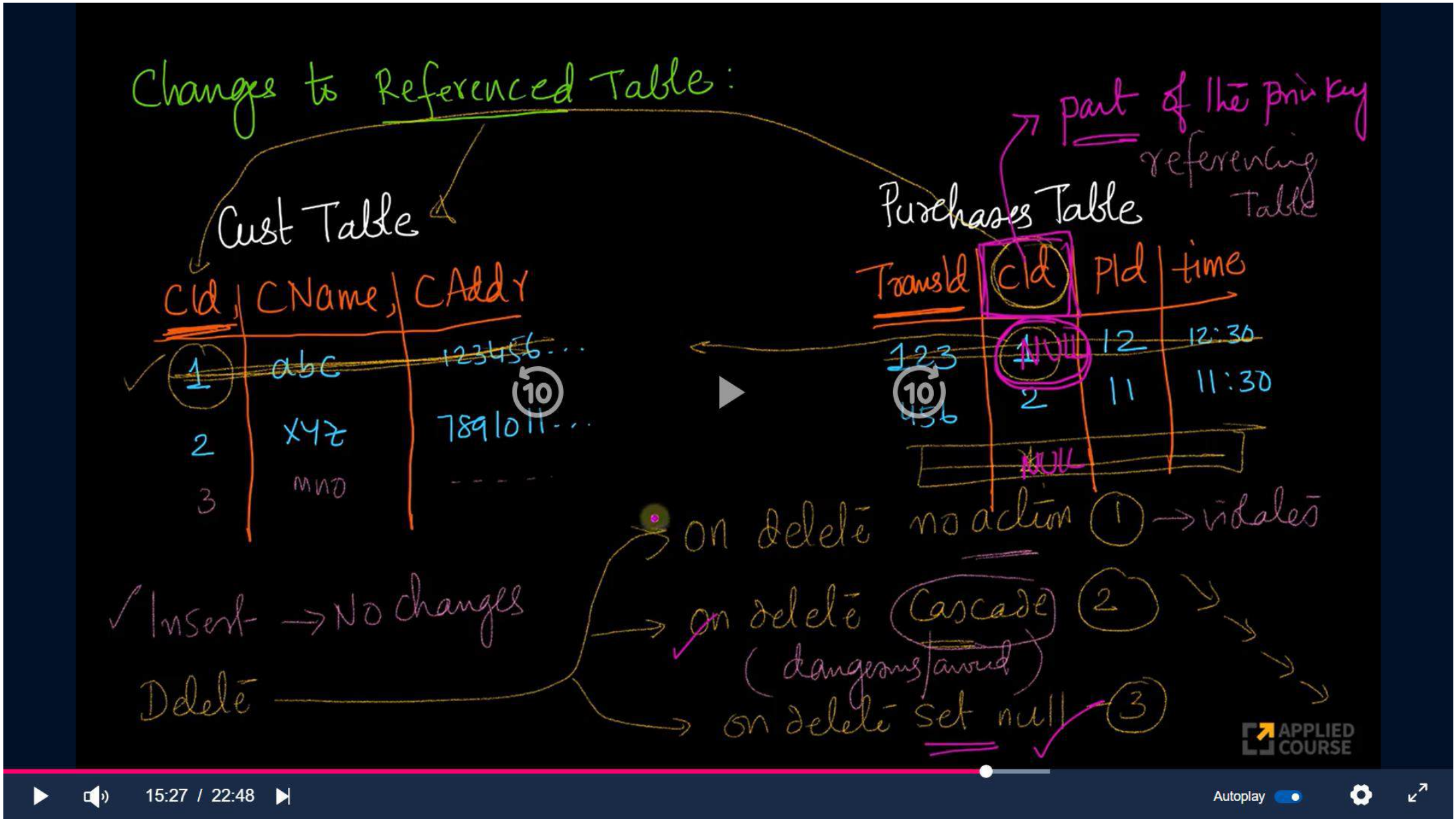


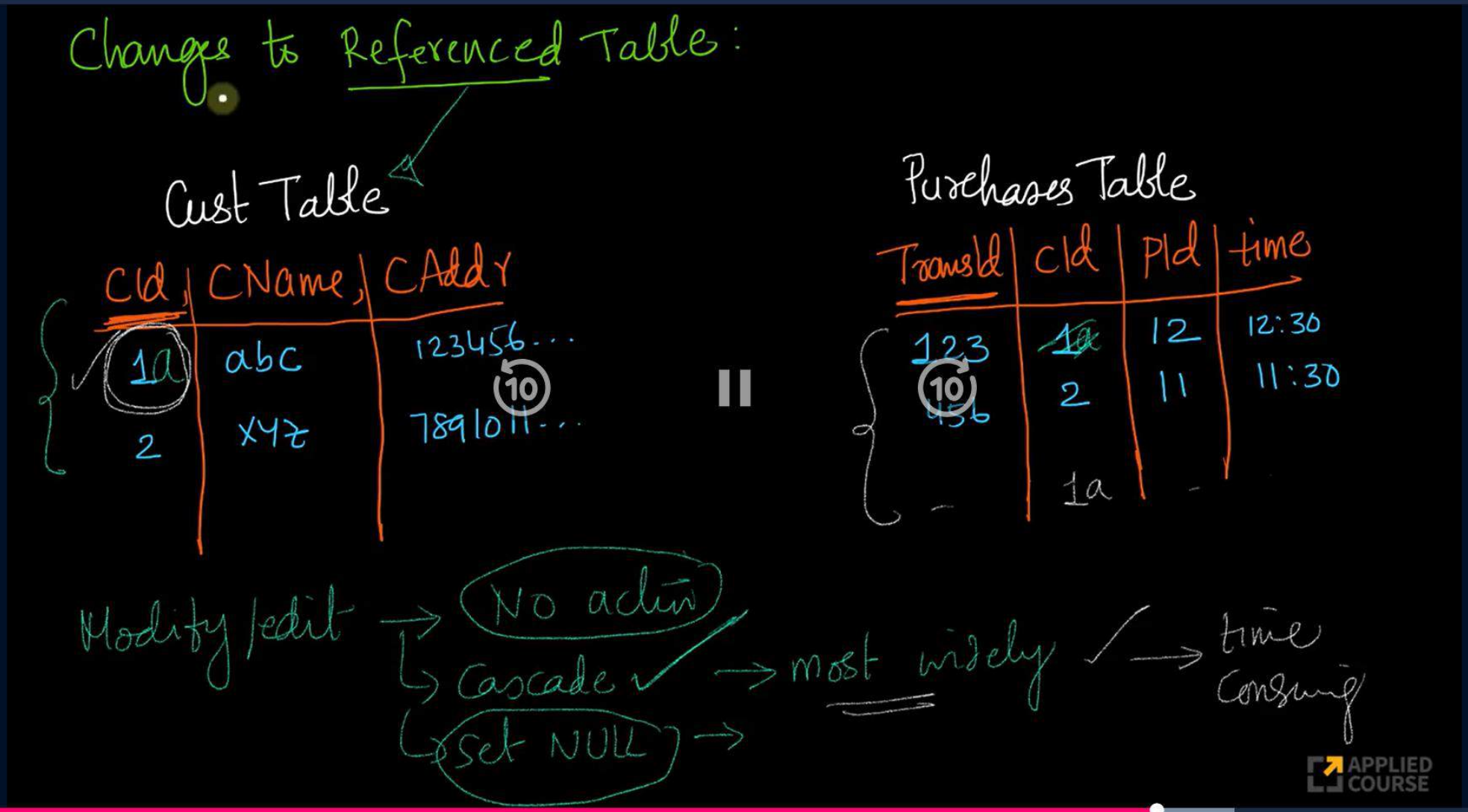
3:46 / 22:48
Autoplay

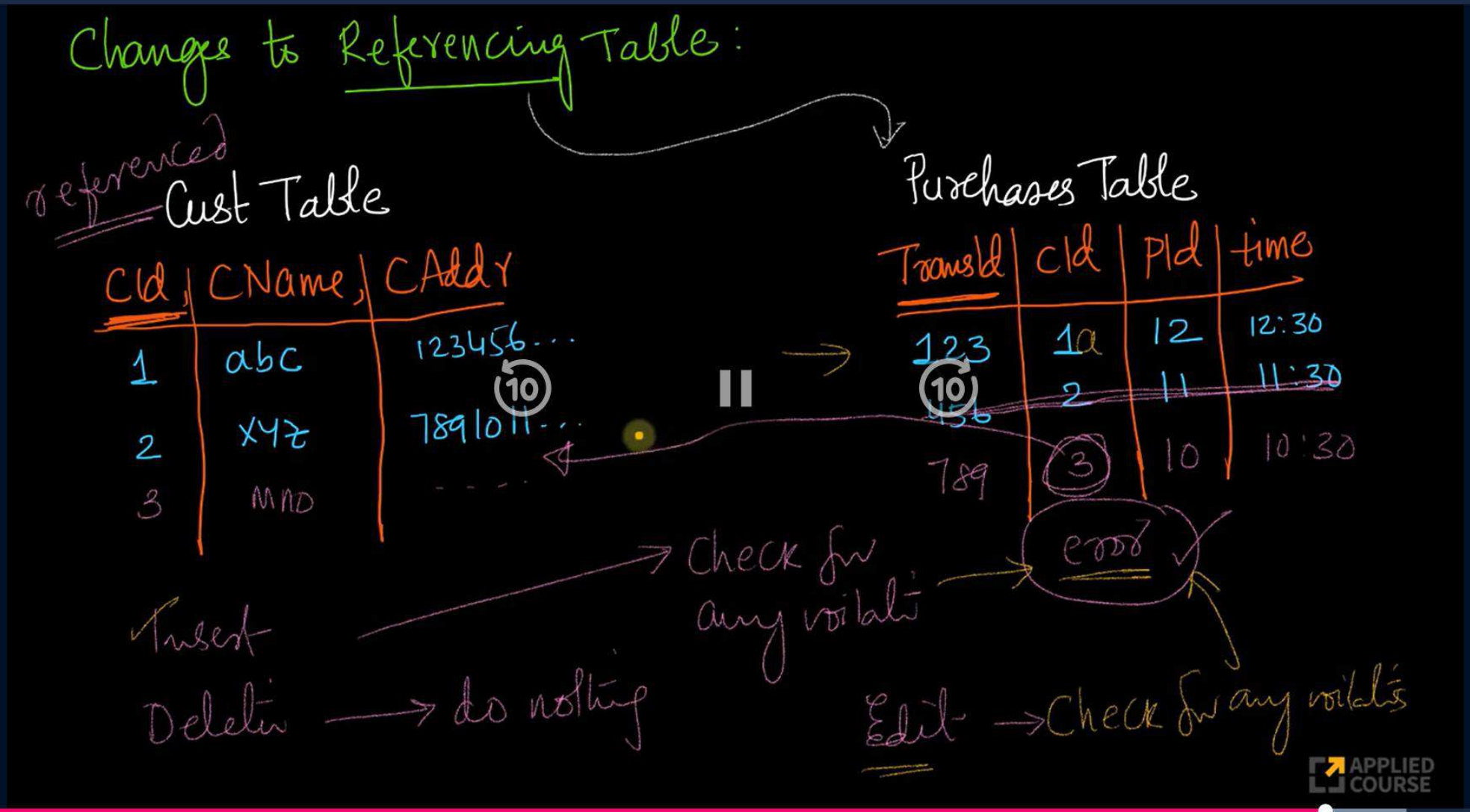

2 Domain integrity:
CustId
{1, 2, 3, ... 10000}
number
int
Column's / attrib
Valid values
10
10
Set
SQL
APPLIED COURSE

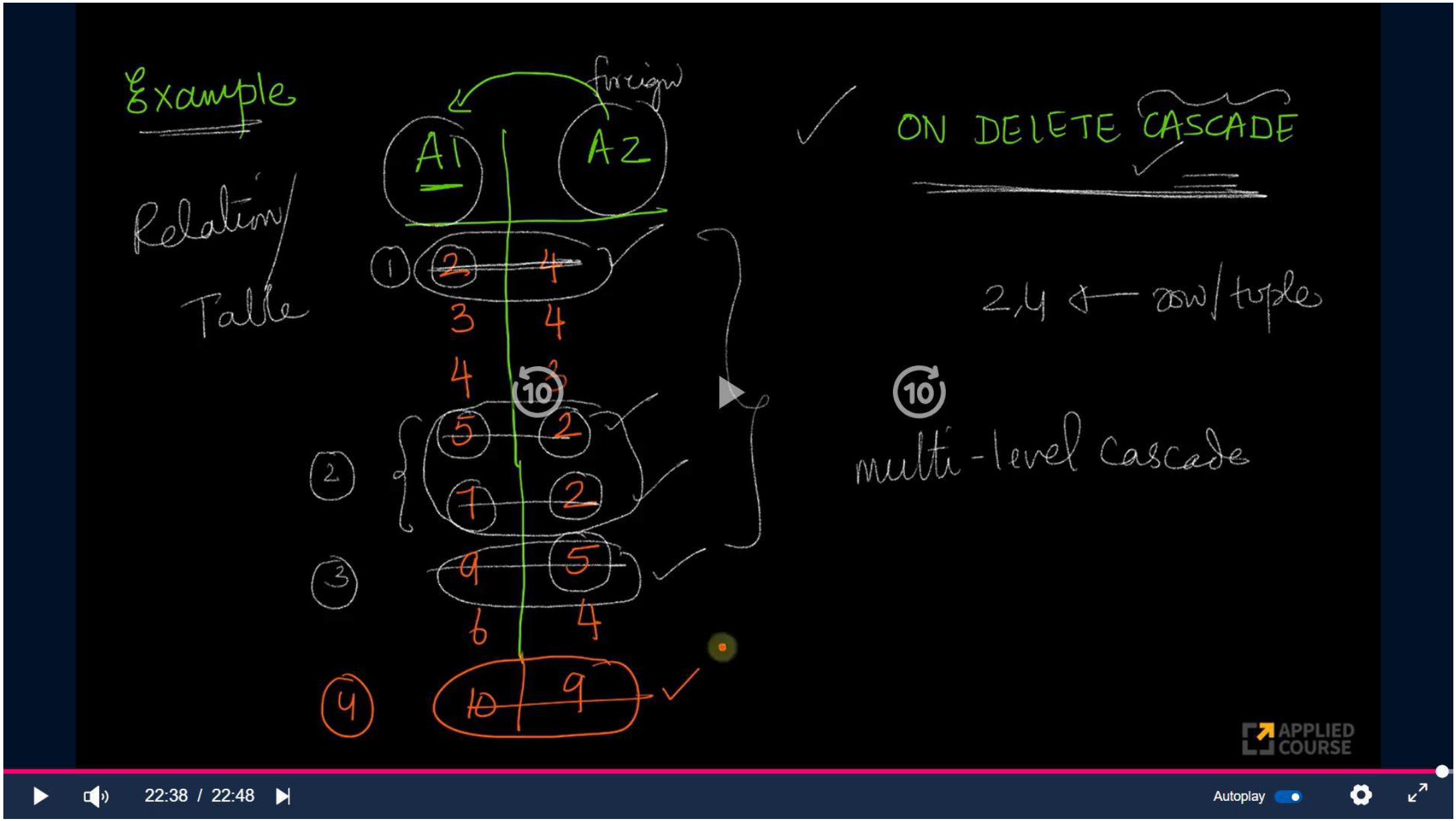

3 User-defined Integrity:
PurchasesTable
TransId, pId, QId, Time, #items
int
≤ 5
10
10
APPLIED COURSE
7:56 / 22:48
Autoplay


4 Referential Integrity : foreign keys
Cust Table
foreign key
Purchases Table
Cld | CName | CAddr
1 | abc | 123456...
2 | xyz | 7891011...
TransId | Cld | Pld | time
123 | 1 | 12 | 12:30
456 | 2 | 11 | 11:30
Referenced Table
Referencing Table
APPLIED COURSE
10:00 / 22:48
Autoplay


Changes to Referenced Table:
Cust Table
Cid | CName | CAddr
1 | abc | 123456...
2 | XYZ | 7891011...
3 | mno
Purchases Table
Part of the Prim key
referencing Table
TransId | Cid | PId | time
123 | 1 | 12 | 12:30
456 | 2 | 11 | 11:30
NULL
10
10
Insert → No changes
Delete
on delete no action (1) → violates
on delete Cascade (2)
(dangerous/avoid)
on delete set null (3)
APPLIED COURSE
15:27 / 22:48
Autoplay


Changes to Referenced Table:
Cust Table
Cid | CName | CAddr
1a | abc | 123456...
2 | xyz | 7891011...
Purchases Table
TransId | Cid | Pid | time
123 | 1a | 12 | 12:30
456 | 2 | 11 | 11:30
1a
Modify/edit
No action
Cascade
set NULL
most widely
time consuming
APPLIED COURSE

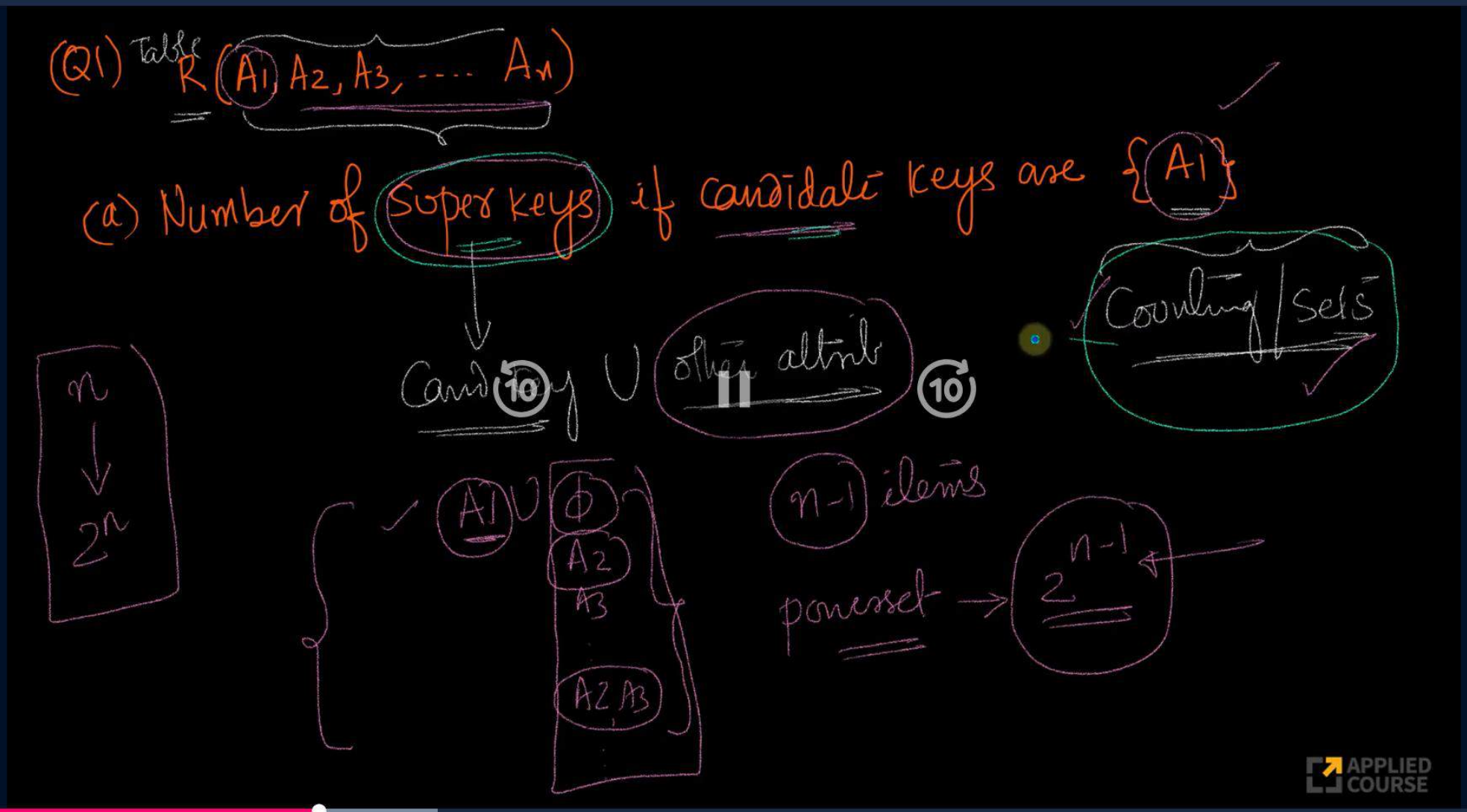

Changes to Referencing Table:
referenced
Cust Table
Cid | CName | CAddr
1 | abc | 123456...
2 | XYZ | 7891011...
3 | MNO
Purchases Table
TransId | Cid | Pid | time
123 | 1a | 12 | 12:30
2 | 11 | 11:30
789 | 3 | 10 | 10:30
Insert
Check for any violati
error
Delete → do nothing
Edit → Check for any violati
APPLIED COURSE

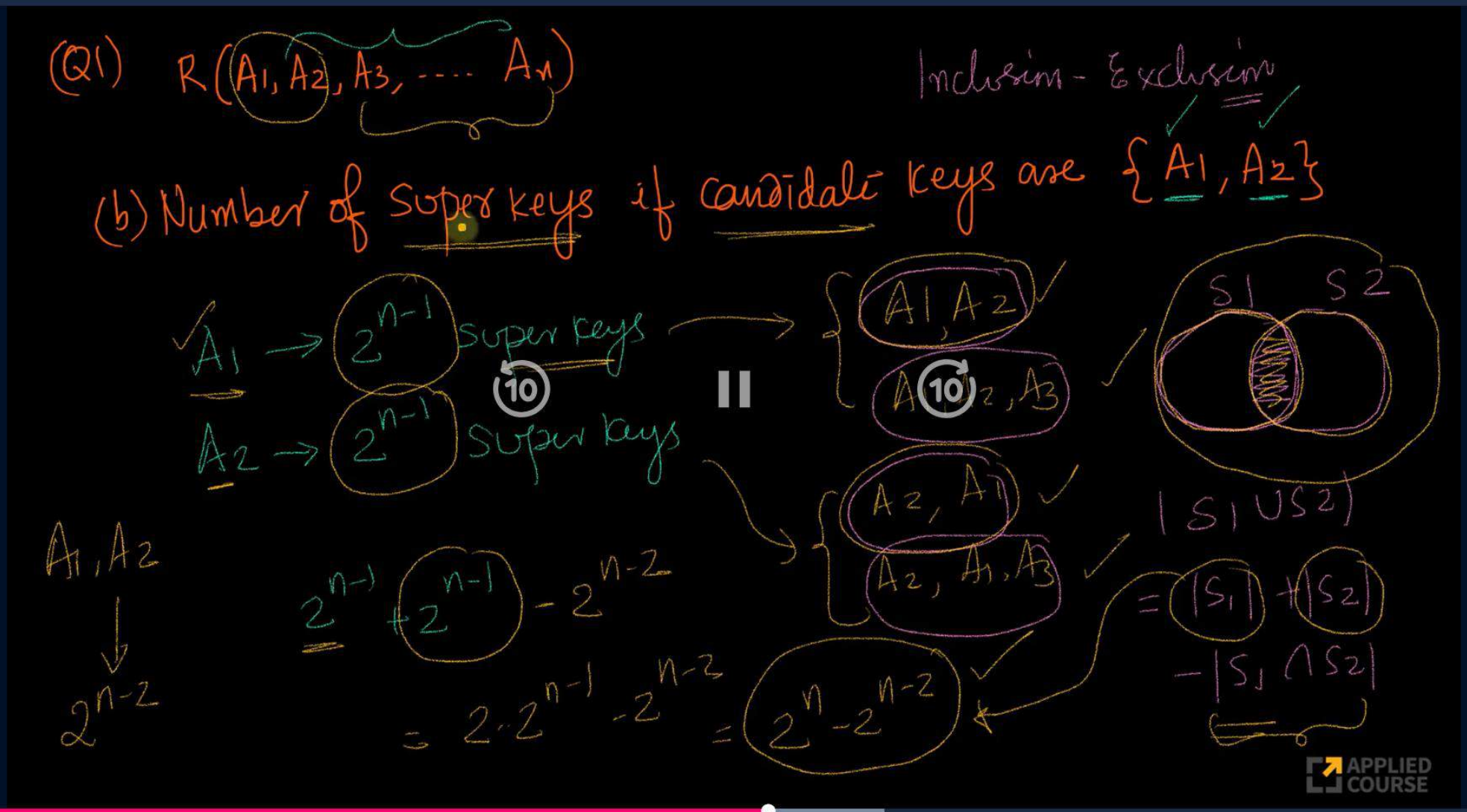

Example
Relation/
Table
foreign
A1
A2
1
2
4
3
4
4
3
10
5
2
2
7
2
3
9
5
6
4
4
10
9
ON DELETE CASCADE
2,4 ← row/tuple
10
multi-level cascade
APPLIED COURSE
22:38 / 22:48
Autoplay

(Q1) $R(A_1, A_2, A_3, \ldots A_n)$

(b) Number of super keys if candidate keys are $\{A_1, A_2\}$

APPLIED COURSE

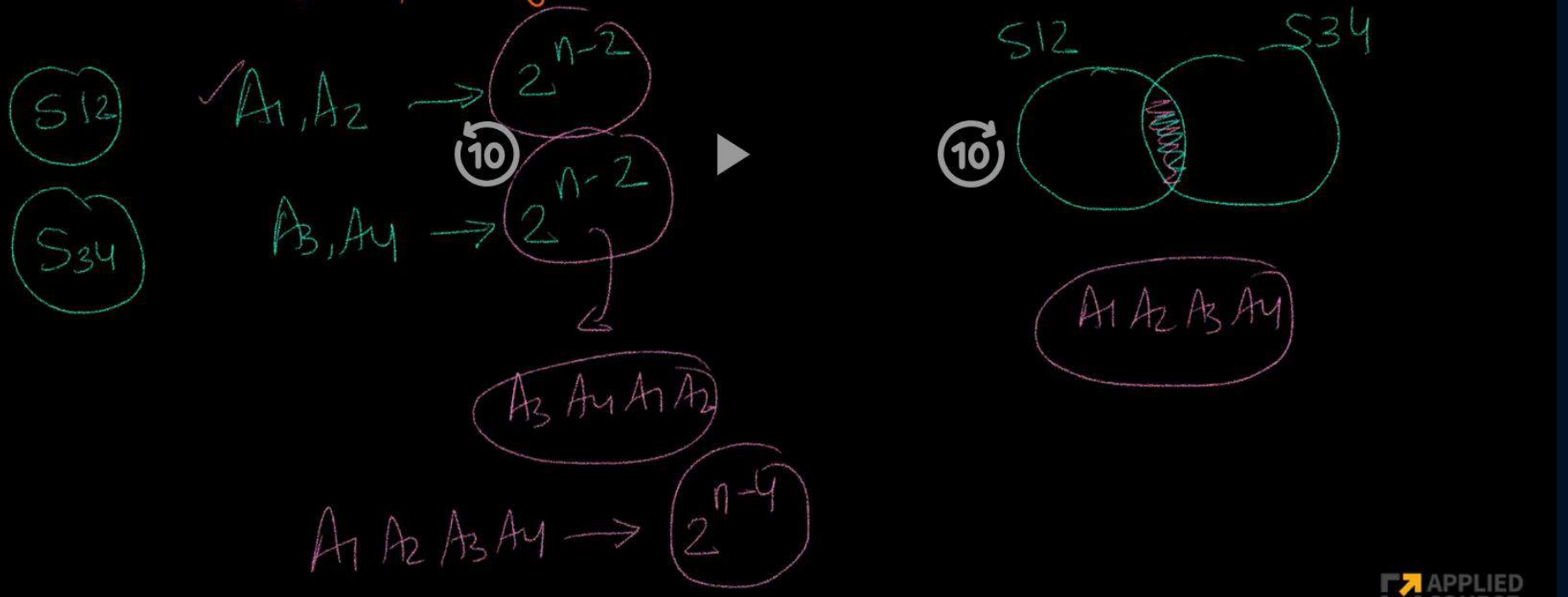

(Q1) Table R (A1, A2, A3, ... An)
(a) Number of Super keys if candidate keys are {A1}
Candidate key
other attrib
Counting / sets
n
2^n
A1 U
Φ
A2
A3
A2 A3
n-1 elems
powerset
2^(n-1)
APPLIED COURSE


(Q1) R(A1, A2, A3, ... An)
Inclusion - Exclusion
(b) Number of Super keys if candidate keys are {A1, A2}
A1 → 2^(n-1) Super keys
A2 → 2^(n-1) Super keys
A1, A2
2^(n-1) + 2^(n-1) - 2^(n-2)
= 2·2^(n-1) - 2^(n-2)
= 2^n - 2^(n-2)
2^(n-2)
A1, A2
A2, A1
A2, A1, A3
S1 S2
|S1 ∪ S2|
= |S1| + |S2| - |S1 ∩ S2|
APPLIED COURSE

(Q1) $R(A_1, A_2, A_3, \ldots A_n)$

$2^{n-2} + 2^{n-2} - 2^{n-4}$

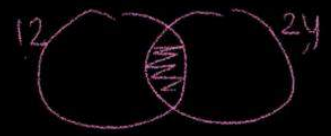
(c) Number of super keys if candidate keys are $\{\{A_1, A_2\}, \{A_3, A_4\}\}$



APPLIED COURSE

10:47 / 16:38 Autoplay

(Q1) $R(A_1, A_2, A_3, \ldots A_n)$



(d) Number of super keys if candidate keys are $\{\{A_1, A_2\}, \{A_2, A_4\}\}$

$A_1, A_2, A_4 \rightarrow 2^{n-3}$

2^{n-2}

2^{n-2}

$2^{n-2} + 2^{n-2} - 2^{n-3}$

APPLIED COURSE

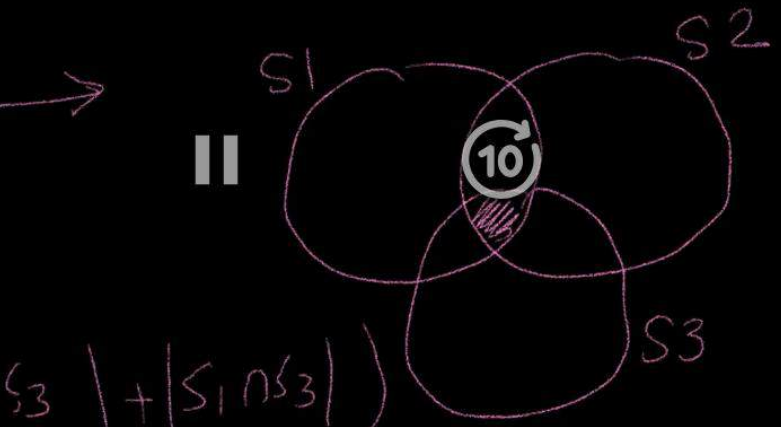
11:43 / 16:38

Autoplay

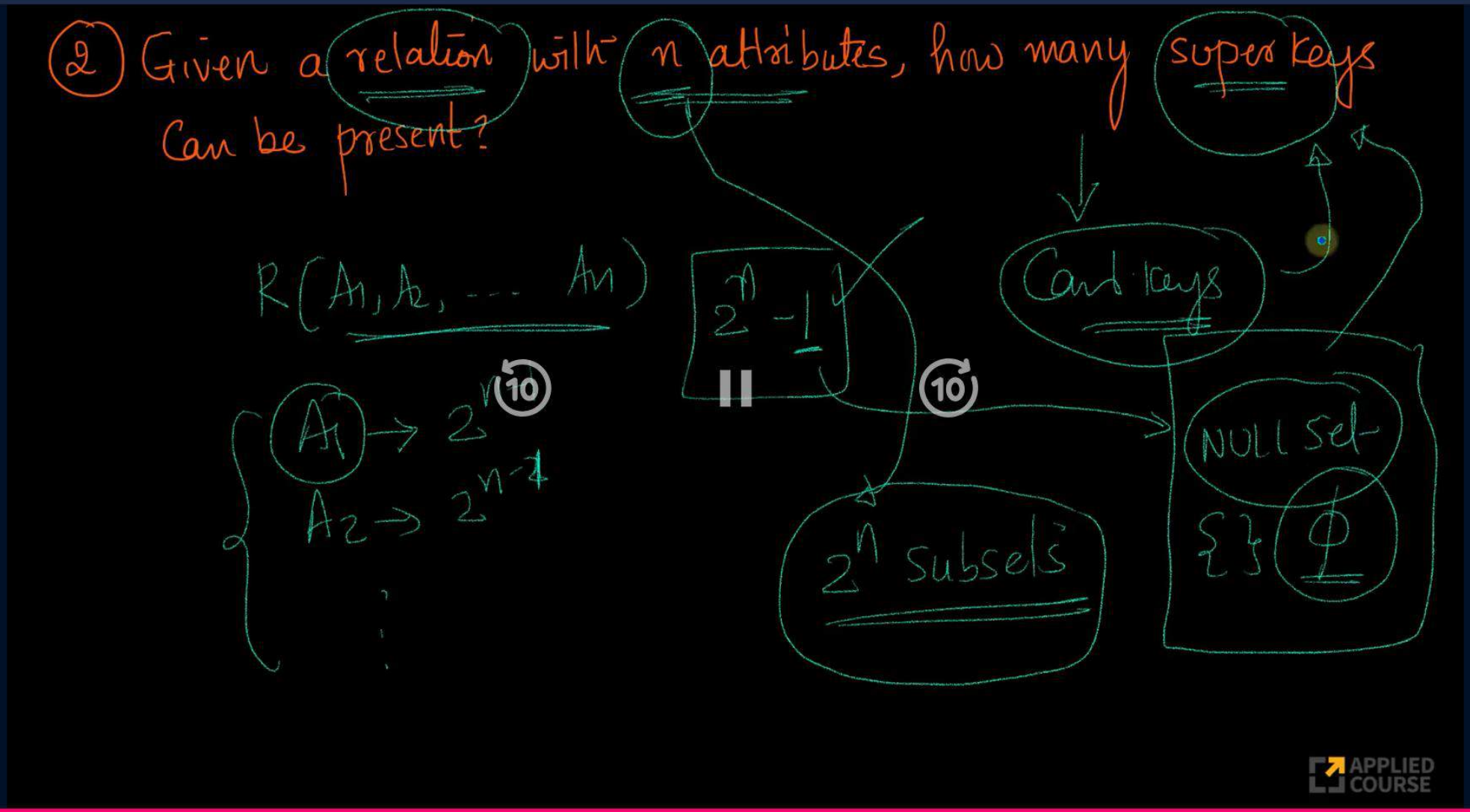
(Q1) $R(A_1, A_2, A_3, \ldots A_n)$ $\left(3 \cdot 2^{n-1} - \{3 \cdot 2^{n-2}\} + 2^{n-3}\right)$

(e) Number of super keys if candidate keys are $\{A_1, A_2, A_3\}$

$$|S_1 \cup S_2 \cup S_3| = |S_1| + |S_2| + |S_3| - (|S_1 \cap S_2| + |S_2 \cap S_3| + |S_1 \cap S_3|) + (|S_1 \cap S_2 \cap S_3|)$$



APPLIED COURSE


(2) Given a relation with n attributes, how many super keys Can be present?
R(A1, A2, ... An)
A1 → 2^n-1
A2 → 2^n-1
2^n - 1
Cand keys
2^n subsets
NULL set
{}
Φ
APPLIED COURSE