



Module 11

Normalization Concepts and Practice

Lesson 2: Functional dependencies



Lesson Objectives

- Define functional dependency
- Explain analogy of functional dependency to unique constraint
- Falsify functional dependencies in sample rows



Functional Dependency Basics

- Constraint on the possible rows in a table
- Value neutral like FKs and PKs
- Asserted
- Understand business rules



FD Definition

- Notation: $X \rightarrow Y$
- X (functionally) determines Y
- For each X value, there is at most one Y value
- $\text{StdNo} \rightarrow \text{StdCity}$ if each StdNo value has at most one StdCity value
- X: left-hand side (LHS) or determinant
- Y: right-hand side (RHS)



Unique Constraint Analogy

- Similar to uniqueness constraint
- Place RHS and LHS in a table by themselves
- Examples
 - OfferNo \rightarrow OffYear
 - OfferNo, StdNo \rightarrow EnrGrade

<u>StdNo</u>	StdClass	<u>OfferNo</u>	OffYear	EnrGrade	CourseNo	CrsDesc
S1	JUN	O1	2017	3.5	C1	DB
S1	JUN	O2	2017	3.3	C2	VB
S2	JUN	O3	2018	3.1	C3	OO
S2	JUN	O2	2017	3.4	C2	VB



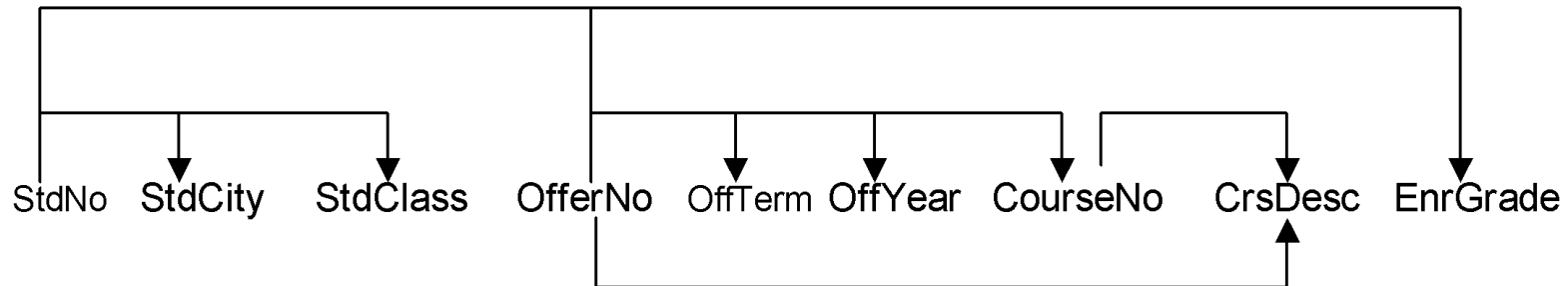
FD Lists and Diagrams

$\text{StdNo} \rightarrow \text{StdCity}, \text{StdClass}$

$\text{OfferNo} \rightarrow \text{OffTerm}, \text{OffYear}, \text{CourseNo}, \text{CrsDesc}$

$\text{CourseNo} \rightarrow \text{CrsDesc}$

$\text{StdNo}, \text{OfferNo} \rightarrow \text{EnrGrade}$



Falsification of FDs using Sample Rows

- Prove non existence (but not existence) by looking at data
- Two rows that have the same X value but a different Y value

<u>StdNo</u>	<u>StdClass</u>	<u>OfferNo</u>	<u>OffYear</u>	<u>EnrGrade</u>	<u>CourseNo</u>	<u>CrsDesc</u>
S1	JUN	O1	2017	3.5	C1	DB
S1	JUN	O2	2017	3.3	C2	VB
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Summary

- FDs are important constraints
- Asserting FDs is essential for removing unwanted redundancy
- Refinement activity

