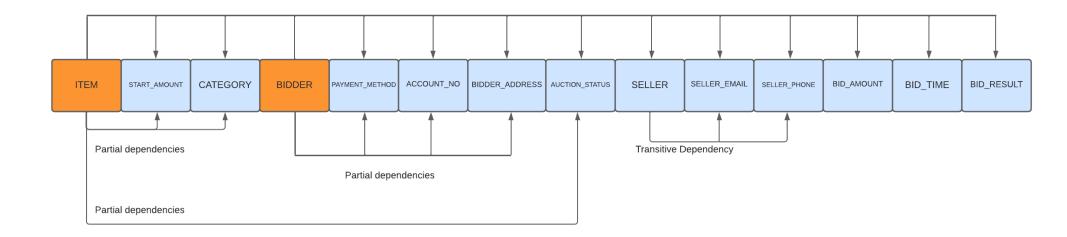
#### **DBMS of an Auction Website - Part 2**

Zubeka Dang

I. **Functional Dependencies:** You should normalize all the tables to be in 3NF. Then you should create dummy data and test and validate the application and try to optimize it. You should show Functional dependencies for all tables in the report.

#### FIRST NORMAL FORM (1NF) DEPENDENCY DIAGRAM:



**ITEM, BIDDER** → START\_BID\_AMOUNT, CATEGORY, PAYMENT\_METHOD, ACCOUNT\_NO, BIDDER\_ADDRESS, AUTION\_STATUS, SELLER\_ID, SELLER\_EMAIL, SELLER\_PHONE, BID\_AMOUNT, BID\_TIME, BID\_RESULT

Partial dependencies:

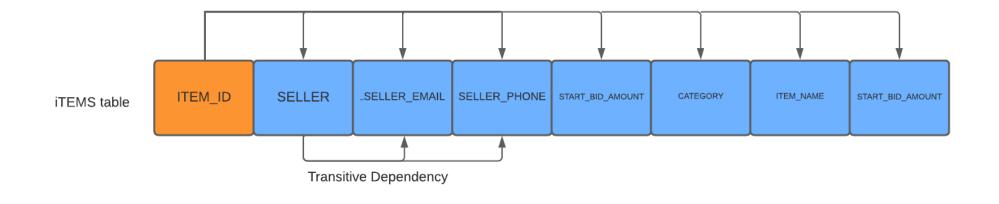
ITEM → START\_BID\_AMOUNT, CATEGORY, AUCTION\_STATUSBIDDER → PAYMENT\_METHOD, ACCOUNT\_NO, BIDDER\_ADDRESS

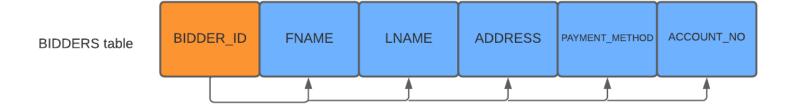
Transitive Dependencies:

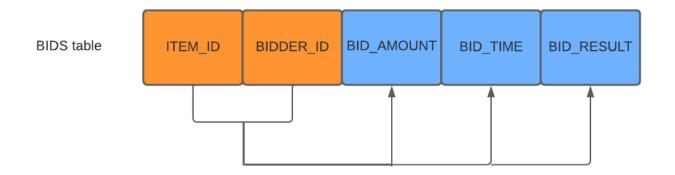
**SELLER** → SELLER\_EMAIL, SELLER\_PHONE

ENTITY	SAMPLE DATA	
ITEM	Millenia necklace	
START_BID_AMOUNT	155	
CATEGORY	Jewelry	
BIDDER	Zubeka Dane	
PAYMENT METHOD	Master Card	
ACCOUNT_NO	6932-5640-56325	
BIDDER_ADDRESS	12 Carberry, Brampton, On, L6J 9E8	
AUTION_STATUS	Closed	
SELLER	Larry Black	
SELLER_EMAIL	larryblack@email.com	
SELLER_PHONE	864-555-2345	
BID_AMOUNT	300.00	
BID_TIME	01-20-2022	
BID_RESULT	Winner	

## SECOND NORMAL FORM (2NF) DEPENDENCY DIAGRAM:







## ITEMS table

 $\begin{tabular}{ll} \textbf{ITEM\_ID} \to \textbf{ITEM\_NAME}, \textbf{START\_BID\_AMOUNT}, \textbf{CATEGORY}, \textbf{AUTION\_STATUS}, \textbf{SELLER\_ID}, \textbf{SELLER\_EMAIL}, \textbf{SELLER\_PHONE} \\ \end{tabular}$ 

#### Transitive dependencies:

SELLER → SELLER\_EMAIL, SELLER\_PHONE

ITEMS Entity	Sample Data	
ITEM_ID	90003	
ITEM	Millenia necklace	
START_BID_AMOUNT	155	
CATEGORY	Jewelry	
AUTION_STATUS	Closed	
SELLER	Larry Black	
SELLER_EMAIL	larryblack@email.com	
SELLER PHONE	864-555-2345	

#### **BIDDERS** table:

**BIDDER\_ID** → BIDDER\_FNAME, BIDDER\_LNAME, PAYMENT\_METHOD, ACCOUNT\_NO, BIDDER\_ADDRESS

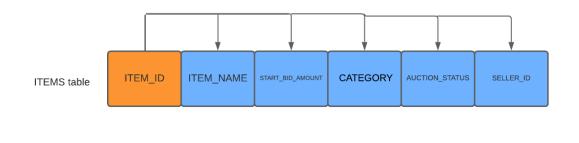
BIDDERS Entity	Sample Data
BIDDER_ID	24002
BIDDER_FNAME	Zubeka
BIDDER_LNAME	Dane
PAYMENT_METHOD	Master Card
ACCOUNT_NO	6932-5640-56325
BIDDER ADDRESS	12 Carberry, Brampton, On, L6J 9E8

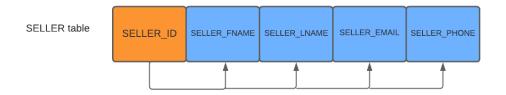
#### **BIDS** table:

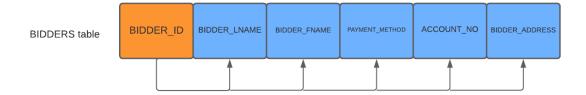
 $\mathbf{ITEM\_ID}, \mathbf{BIDDER\_ID} \to \mathbf{BID\_AMOUNT}, \mathbf{BID\_TIME}, \mathbf{BID\_RESULT}$ 

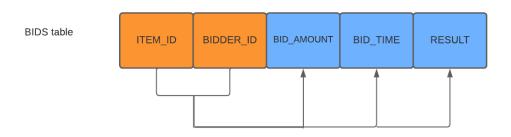
BIDS Entity	Sample Data
ITEM_ID	90003
BIDDER_ID	24002
BID_AMOUNT	300.00
BID TIME	01-20-2022
BID RESULT	Winner

#### THIRD NORMAL FORM (3NF) DEPENDENCY DIAGRAM:









## ITEMS table

 $\underline{\textbf{ITEM} \ \textbf{ID}} \boldsymbol{\rightarrow} \textbf{ITEM\_NAME}, \textbf{START\_BID\_AMOUNT}, \textbf{CATEGORY}, \textbf{AUTION\_STATUS},$ 

ITEMS Entity	Sample Data
ITEM_ID	90003
ITEM	Millenia necklace
START_BID_AMOUNT	155
CATEGORY	Jewelry
AUTION STATUS	Closed
SELLER_ID	19002

## **SELLERS table:**

 $\underline{\textbf{SELLER} \ \textbf{ID}} \boldsymbol{\rightarrow} \textbf{SELLER}\underline{\textbf{FNAME}}, \textbf{SELLER}\underline{\textbf{LNAME}}, \textbf{SELLER}\underline{\textbf{EMAIL}}, \textbf{SELLER}\underline{\textbf{PHONE}}$ 

SELLERS Entity	Sample Data
SELLER_ID	19002
SELLER_FNAME	Larry
SELLER_LNAME	Black
SELLER EMAIL	larryblack@email.com
SELLER PHONE	864-555-2345

#### **BIDDERS** table:

 $\mathbf{BIDDER\_ID} \boldsymbol{\rightarrow} \mathsf{BIDDER\_FNAME}, \mathsf{BIDDER\_LNAME}, \mathsf{PAYMENT\_METHOD}, \mathsf{ACCOUNT\_NO}, \mathsf{BIDDER\_ADDRESS}$ 

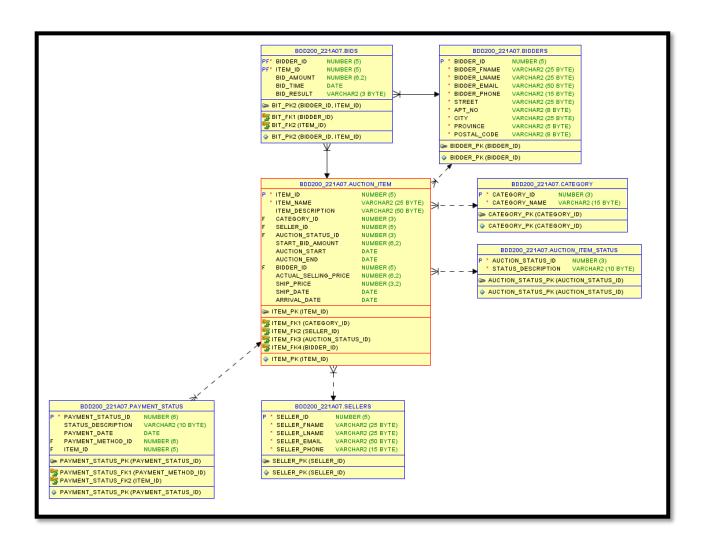
BIDDERS Entity	Sample Data
BIDDER_ID	24002
BIDDER_FNAME	Zubeka
BIDDER_LNAME	Dane
PAYMENT_METHOD	Master Card
ACCOUNT NO	6932-5640-56325
BIDDER ADDRESS	12 Carberry, Brampton, On, L6J 9E8

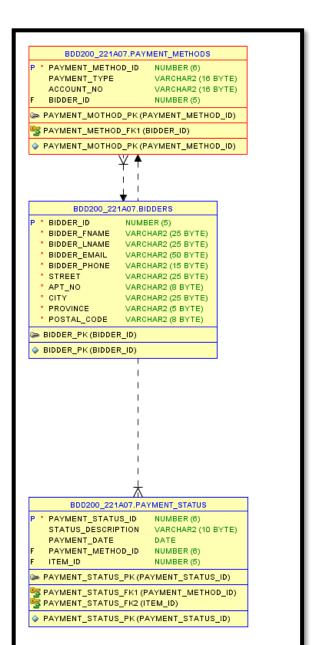
## **BIDS** table:

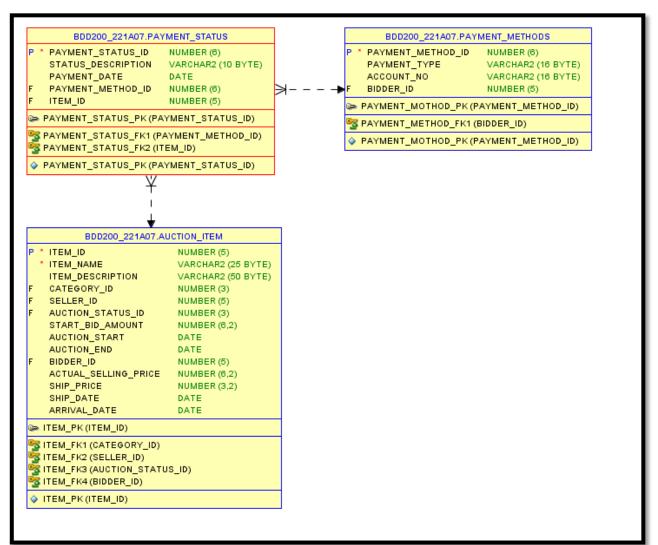
 $\mathbf{ITEM\_ID}, \mathbf{BIDDER\_ID} \to \mathbf{BID}\_\mathbf{AMOUNT}, \mathbf{BID}\_\mathbf{TIME}, \mathbf{BID}\_\mathbf{RESULT}$ 

BIDS Entity	Sample Data
ITEM_ID	90003
BIDDER_ID	24002
BID AMOUNT	300.00
BID TIME	01-20-2022
BID_RESULT	Winner

II. **Normalization / 3<sup>rd</sup> NF**: Verify all tables being in 3NF. Add FDs to change some tables to not be in 3NF and then decompose it to 3NF tables. Show the details for making that table 3NF. You can use diagram (shown in the class) or explain why your tables are 3NF. Then verify all tables whether or not they are in 3NF.







## Improving the design:

## **SELLERS** (SELLER\_ID, SELLER\_FNAME, SELLER\_LNAME, SELLER\_EMAIL, SELLER\_PHONE)

SELLER ID	SELLER_FNAME	SELLER_LNAME	SELLER_EMAIL	SELLER_PHONE

## Functional Dependencies:

## ${\tt SELLER\_ID} \rightarrow {\tt SELLER\_FNAME}, {\tt SELLER\_LNAME}, {\tt SELLER\_EMAIL}, {\tt SELLER\_PHONE}$

SELLER_I D	SELLER_FNAM E	SELLER_LNA ME	SELLER_EMAIL	SELLER_PHON E
19001	John	Smith	johnsmith@email.com	345-998- 1234
19002	Larry	Black	larryblack@email.com	864-555- 2345
19003	Channel	Ralph	channelralph@email.co m	866-123- 3445

## CATEGORY (CATEGORY\_ID, CATEGORY\_NAME)

<u>CATEGORY ID</u>	CATEGORY NAME

## Functional Dependencies:

## ${\tt CATEGORY\_ID} \to {\tt CATEGORY\_NAME}$

CATEGORY_ID	CATEGORY_NAME
301	Art
302	Car
303	Sculpture
304	Jewelry
305	Real Estate
306	Music

## AUCTION\_ITEM\_STATUS (AUCTION\_STATUS\_ID, STATUS\_DESCRIPTION)

AUCTION STATUS ID	STATUS DESCRIPTION

Functional Dependencies:

 ${\tt AUCTION\_STATUS\_ID} \to {\tt STATUS\_DESCRIPTION}$ 

AUCTION STATUS ID	STATUS_DESCRIPTION
101	Future
102	Current
103	Closed

# **AUCTION\_ITEM** (ITEM\_ID, ITEM\_NAME, ITEM\_DESCRIPTION, START\_BID\_AMOUNT, AUCTION-START, AUCTION\_END, CATEGORY\_ID, SELLER\_ID, AUCTION\_STATUS\_ID, BIDDER\_ID)

ITEM_ID	ITEM_NAME	ITEM_DESCRIPTION	START_BID_AMOUNT	AUCTION- START
AUCTION END	CATEGORY ID	SELLER ID	AUCTION STATUS ID	BIDDER_ID

Functional Dependencies:

 $\begin{tabular}{l} \textbf{ITEM\_ID} \to \textbf{ITEM\_NAME}, \textbf{ITEM\_DESCRIPTION}, \textbf{START\_BID\_AMOUNT}, \textbf{AUCTION\_START}, \textbf{AUCTION\_END}, \textbf{CATEGORY\_ID}, \textbf{SELLER\_ID}, \textbf{AUCTION\_STATUS\_ID}, \textbf{BIDDER\_ID} \\ & \textbf{AUCTION\_STATUS\_ID}, \textbf{BIDDER\_ID} \\ \end{tabular}$ 

ITEM ID	ITEM_ NAME	ITEM_DESC RIPTION	START_BI D_AMOU NT	AUCTION -START	AUCTIO N_END	CATEGO RY ID	SELLER _ID	AUCTION STA TUS ID	BIDDER I D
90002	1909 Volks wagen Beetle	Classical red Volkswagen Beetle, sunroof	302	19001	102	3000	02-26- 2022	03-26-2022	<u>NULL</u>
90003	Milleni a neckla ce	Octagon cut, Pink, Rose gold-tone plated	304	19002	103	155	01-10- 2022	01-20-2022	24002
90004	Best Of Bob Marley	Audio CD	306	19003	103	27	03-01- 2022	03-26-2022	24001

## **BIDDERS** (<u>BIDDER\_ID</u>, BIDDER\_FNAME, BIDDER\_LNAME, BIDDER\_EMAIL, BIDDER\_PHONE, STREET, APT\_NO, CITY, PROVINCE, POSTAL\_CODE)

BIDDER_ID	BIDDER_FNAME	BIDDER_LNAME	BIDDER_EMAIL	BIDDER_PHONE
	STREET	APT NO	PROVINCE	POSTAL CODE

Functional Dependencies:

BIDDER\_ID → BIDDER\_FNAME, BIDDER\_LNAME, BIDDER\_EMAIL, BIDDER\_PHONE, STREET, APT\_NO, PROVINCE, POSTAL\_CODE

BIDDER I D	BIDDER_FNA ME	BIDDER_LNA ME	BIDDER_EMAIL	BIDDER_PHO NE	STREET	APT_N O	PROVIN CE	POSTAL_CO DE
24001	David	Tras	davidtras@email.co m	856-456-9875	Keele str	187	Toronto	ON
24002	Zubeka	Dane	zubekadane@email.c	365-998-6789	Carberry	12	Brampton	ON
24003	Roy	Lin	roylin@email.com	541-546-4569	Sherbroo ke St W	845	Montreal	QC

#### BIDS (BIDDER\_ID, ITEM\_ID, BID\_AMOUNT, BID\_TIME, BID\_RESULT)

BIDDER ID	ITEM ID	BID AMOUNT	BID TIME	BID RESULT

Functional Dependencies:

 ${\tt BIDDER\_ID, ITEM\_ID \to BID\_AMOUNT, BID\_TIME, BID\_RESULT}$ 

BIDDER ID	ITEM ID	BID_AMOUNT	BID_TIME	BID_RESULT
24001	90004	50	03-15-2022	Winner
24001	90002	8000	03-15-2022	Uncertain
24002	90003	300	01-20-2022	Winner
24002	90002	6000	03-22-2022	Uncertain
24003	90003	200	01-10-2022	Loser
24003	90002	5000	03-10-2022	Uncertain
24002	90004	30	03-11-2022	Loser

## ${\bf PAYMENT\_METHODS}~(\underline{PAYMENT\_METHOD\_ID}, PAYMENT\_TYPE, ACCOUNT\_NO, \underline{BIDDER\_ID})$

DATE OF THE PARTY OF THE	DATE OF THE	A GGGLDIE NG	DIDDED ID
PAYMENT METHOD ID	PAYMENT_TYPE	ACCOUNT_NO	<u>BIDDER_ID</u>

Functional Dependencies:

 ${\tt PAYMENT\_METHOD\_ID} \rightarrow {\tt PAYMENT\_TYPE}, {\tt ACCOUNT\_NO}, {\tt BIDDER\_ID}$ 

PAYMENT METHOD ID	PAYMENT_TYPE	ACCOUNT_NO	BIDDER ID
161301	Visa	4550-1977- 56489	24001
161302	Master Card	6932-5640- 56325	24002
161303	Paypal	564582	24003

## ${\bf PAYMENT\_STATUS} \ (\underline{PAYMENT\_STATUS\_ID}, \ \underline{STATUS\_DESCRIPTION}, \ \underline{PAYMENT\_DATE}, \ \underline{PAYMENT\_MOTHOD\_ID}, \ \underline{ITEM\_ID})$

PAYMENT_STATUS_ID	STATUS_DESCRIPTION	PAYMENT_DATE
	PAYMENT MOTHOD ID	ITEM_ID

#### Functional Dependencies:

 ${\tt PAYMENT\_STATUS\_ID} \rightarrow {\tt STATUS\_DESCRIPTION}, {\tt PAYMENT\_DATE}, {\tt PAYMENT\_MOTHOD\_ID}, {\tt ITEM\_ID}$ 

PAYMENT STATUS ID	STATUS_DESCRIPTION	PAYMENT_DATE	PAYMENT MOTHOD ID	ITEM ID
161901	Paid	01-20-2022	161302	90003
161902	Pending	NULL	<u>NULL</u>	90004

We can see that all tables are in third normal form (3NF) because it contains no transitive dependencies.

III. **Demonstration of GUI using Oracle APEX**: The DB application should be in 3NF and contain dummy records and brief comments in the code about any special cases and advanced report. You should make web application by Oracle APEX should be connected to your DB. You will submit the URL link to access your application and the screenshots of every part of your application.

Application Link: <a href="https://apex.oracle.com/pls/apex/r/bdd200">https://apex.oracle.com/pls/apex/r/bdd200</a> auction project/auction-website/auction-time?session=116506215384919

