



Republic of the Philippines  
**University of Southeastern Philippines**  
Obrero, Davao City  
**College of Information and Computing**



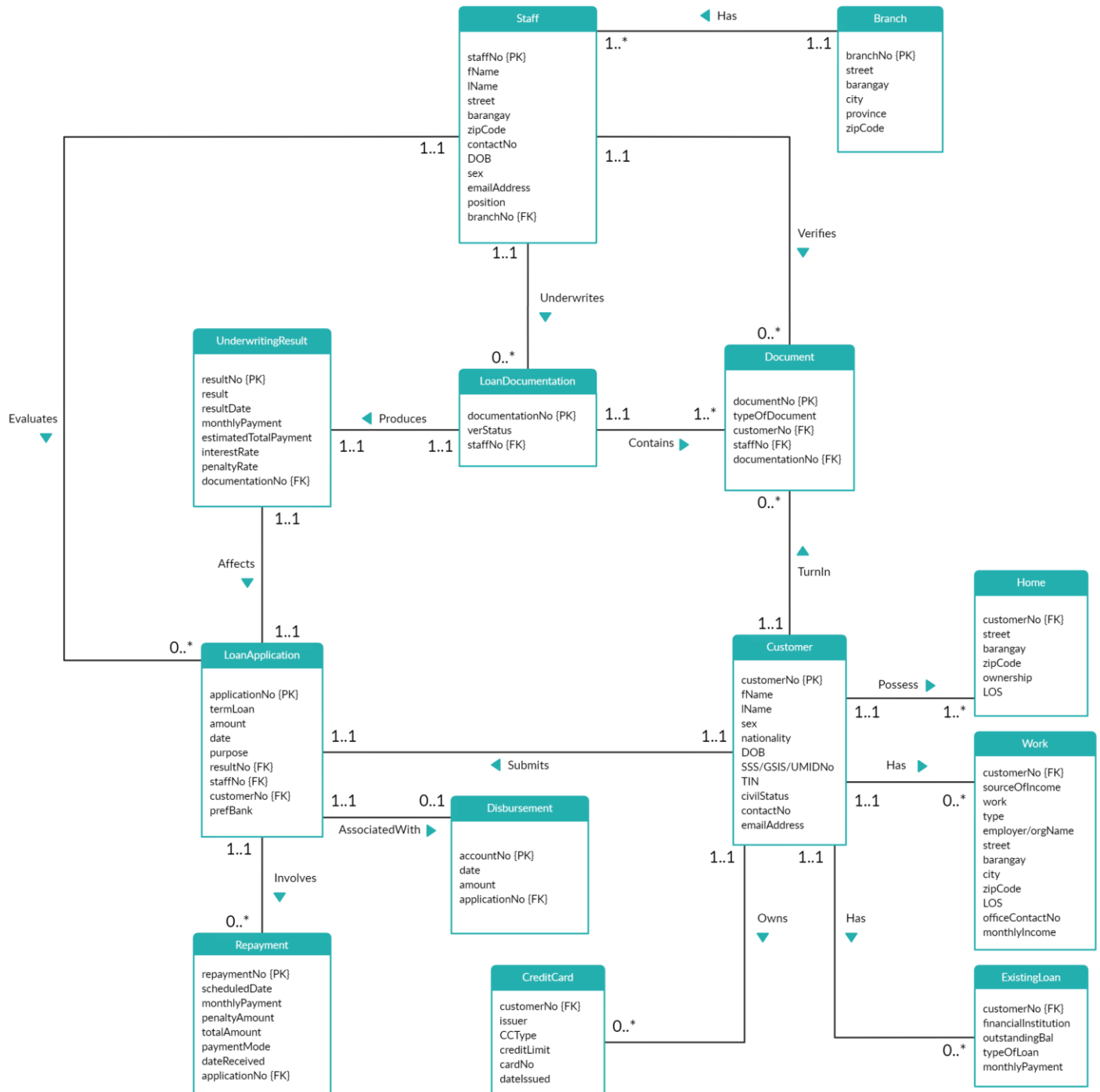
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System	: Online Loan Management System
Company/Office	: AB Finance Corporation
Project Stage	: Logical Data Model
Date	: November 26, 2020
Subject	: CS 213 – Database Management System
Group Name	: Team 007
Group Members	: Kenith S. Lumantas – 2019-00260 Cyrelle John A. Domingo – 2019-00397 (Team Leader) Edgardo V. Amigo – 2019-00409

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### III. LOGICAL DATABASE DESIGN

#### 3.1 FINAL ERD



#### Revisions

- Removes unnecessary EERD.
- Adds repayment entity.
- Changes on the relationship of disbursement entity.
- Change in some minor aesthetic designs.
- Major changes because of Logical Database Design.

### 3.2 FINAL DATA DICTIONARY

#### Branch

Attribute	Description	Type	Size	Null	Unique	Part Of PK	Foreign Key	FK Relation
branchNo	Branch unique code	Character	4	No	Yes	Yes	No	
street	Street address	Variable character		No	No	No	No	
barangay	Barangay address	Var char		No	No	No	No	
city	City address	Var char		No	No	No	No	
province	Province address	Var char		No	No	No	No	
zipCode	Zip code address	Char	5	No	No	No	No	

#### Staff

Attribute	Description	Type	Size	Null	Unique	Part Of PK	Foreign Key	FK Relation
staffNo	Staff unique code	Char	7	No	Yes	Yes	No	
fName	First name	Var char		No	No	No	No	
lName	Last name	Var char		No	No	No	No	
street	Street address	Var char		No	No	No	No	
barangay	Barangay address	Var char		No	No	No	No	
zipCode	Zip code address	Char	5	No	No	No	No	
contactNo	Contact no	Char	12	No	Yes	No	No	
DOB	Date of birth	Date		No	No	No	No	
sex	Sex	Enum		No	No	No	No	
emailAddress	Email address	Var char		No	Yes	No	No	
position	Position	Enum		No	No	No	No	
branchNo	Branch unique code	Char	4	No	Yes	No	Yes	Branch

#### Customer

Attribute	Description	Type	Size	Null	Unique	Part Of PK	Foreign Key	FK Relation
customerNo	Customer unique code	Char	10	No	Yes	Yes	No	
fName	First name	Var char		No	No	No	No	
lName	Last name	Var char		No	No	No	No	
sex	Sex	Enum		No	No	No	No	
nationality	Country of birth	Var char		No	No	No	No	
DOB	Date of birth	Date		No	No	No	No	
SSS/GSIS/UMIDNo	Id no of customer	Char	15	No	Yes	No	No	
TIN	Tax identification no	Char	15	No	Yes	No	No	
civilStatus	Civil status	Enum		No	No	No	No	
contactNo	Contact No	Char	12	No	Yes	No	No	
emailAddress	Email address	Var char		No	Yes	No	No	

#### LoanDocumentation

Attribute	Description	Type	Size	Null	Unique	Part Of PK	Foreign Key	FK Relation
documentationNo	Unique code of documentation	Char	8	No	Yes	Yes	No	
verStatus	Doc verification status	Enum		No	No	No	No	
staffNo	Unique code of staff	Char	7	No	Yes	No	Yes	Staff

## Home

Attribute	Description	Type	Size	Null	Unique	Part Of PK	Foreign Key	FK Relation
street	Customer street address	Var char		No	No	No	No	
barangay	Customer barangay address	Var char		No	No	No	No	
zipCode	Customer zip code	Char	5	No	No	No	No	
Ownership	Ownership of home	Enum		No	No	No	No	
LOS	Length of stay	Char		No	No	No	No	
customerNo	Unique customer code	Char	10	No	Yes	No	Yes	Customer

## Work

Attribute	Description	Type	Size	Null	Unique	Part Of PK	Foreign Key	FK Relation
sourceOfIncome	Customer source of income	Enum		No	No	No	No	
work	Work of customer	Var char		No	No	No	No	
type	Customer type of work	Enum		No	No	No	No	
employer/orgName	Person or org work at	Var char		Yes	No	No	No	
street	Street address of work	Var char		No	No	No	No	
barangay	Barangay address	Var char		No	No	No	No	
city	City address	Var char		No	No	No	No	
zipCode	Zip code address	Char	5	No	No	No	No	
LOS	Length of stay of work	Char		No	No	No	No	
officeContactNo	Office contact no	Char	12	No	No	No	No	
monthlyIncome	Monthly income	Decimal	10	No	No	No	No	
customerNo	Unique customer code	Char	10	No	Yes	No	Yes	Customer

## ExistingLoan

Attribute	Description	Type	Size	Null	Unique	Part Of PK	Foreign Key	FK Relation
financialInstitution	Financial institution of loan	Var char		No	No	No	No	
outstandingBal	Outstanding balance	Decimal	11	No	No	No	No	
typeOfLoan	Type of loan	Var char		No	No	No	No	
monthlyPayment	Monthly payment	Decimal	10	No	No	No	No	
customerNo	Unique customer code	Char	10	No	Yes	No	Yes	Customer

## CreditCard

Attribute	Description	Type	Size	Null	Unique	Part Of PK	Foreign Key	FK Relation
issuer	Bank name	Var char		No	No	No	No	
CCType	Type of credit card	Enum		No	No	No	No	
creditLimit	Credit limit	Decimal	11	No	No	No	No	
cardNo	Card no	Char	20	No	Yes	No	No	
dateIssued	Issued date of credit card	Date		No	No	No	No	
customerNo	Unique customer code	Char	10	No	Yes	No	Yes	Customer

## Document

Attribute	Description	Type	Size	Null	Unique	Part Of PK	Foreign Key	FK Relation
documentNo	Unique code of document	Char	17	No	Yes	Yes	No	
typeOfdocument	Type of document	Char		No	No	No	No	
customerNo	Unique code of document	Char	10	No	Yes	No	Yes	Customer
staffNo	Unique code of staff	Char	7	No	Yes	No	Yes	Staff
documentationNo	Doc unique code	Char	8	No	Yes	No	Yes	Documentation

**UnderwritingResult**

Attribute	Description	Type	Size	Null	Unique	Part Of PK	Foreign Key	FK Relation
resultNo	Unique code of result	Char	5	No	Yes	Yes	No	
result	Result	Enum		No	No	No	No	
resultDate	Release date of result	Date		No	No	No	No	
monthlyPayment	Monthly payment	Decimal	10	No	No	No	No	
estimatedTotalPayment	Est total payment	Decimal	11	No	No	No	No	
interestRate	Interest rate of loan	Decimal	5	No	No	No	No	
penaltyRate	Penalty rate of loan	Decimal	5	No	No	No	No	
documentationNo	Doc unique code	Char	8	No	Yes	No	Yes	LoanDocumentation

**LoanApplication**

Attribute	Description	Type	Size	Null	Unique	Part Of PK	Foreign Key	FK Relation
applicationNo	Application unique code	Char	6	No	Yes	Yes	No	
termLoan	Duration of repayment	Enum		No	No	No	No	
amount	Amount	Decimal	11	No	No	No	No	
date	Date applied	Date		No	No	No	No	
purpose	Purpose of loan	Var char		No	No	No	No	
prefBank	Customer preferred bank	Var char		No	No	No	No	
resultNo	Unique code of result	Char	5	No	Yes	No	Yes	UnderwritingResult
staffNo	Unique code of staff	Char	7	No	Yes	No	Yes	Staff
customerNo	Unique code of customer	Char	10	No	Yes	No	Yes	Customer

**Disbursement**

Attribute	Description	Type	Size	Null	Unique	Part Of PK	Foreign Key	FK Relation
accountNo	Provided acc no pref bank	Char	20	No	Yes	Yes	No	
date	Disbursal date	Date		No	No	No	No	
amount	Amount disburse	Decimal	11	No	No	No	No	
applicationNo	Unique code of application	Char	6	No	Yes	No	Yes	LoanApplication

**Repayment**

Attribute	Description	Type	Size	Null	Unique	Part Of PK	Foreign Key	FK Relation
repaymentNo	Repayment unique code	Char	11	No	Yes	Yes	No	
scheduledDate	Repayment date	Date		No	No	No	No	
monthlyPayment	Monthly payment amount	Decimal	10	No	No	No	No	
penaltyAmount	Penalty amount	Decimal	10	No	No	No	No	
totalAmount	Toal amount	Decimal	10	No	No	No	No	
paymentMode	Payment mode	Enum		No	No	No	No	
dateReceived	Date repayment received	Date		No	No	No	No	
applicationNo	Application unique code	Char	6	No	No	No	Yes	LoanApplication

### 3.3.1 RELATIONSHIP

Entity Type	Multiplicity	Relationship	Multiplicity	Entity Type
Branch	1..1	has	1..*	Staff
Staff	1..1	verifies	0..*	Document
Staff	1..1	underwrites	0..*	LoanDocumentation
Staff	1..1	evaluates	0..*	LoanApplication
Customer	1..1	turnin	0..*	Document
Customer	1..1	possess	1..*	Home
Customer	1..1	has	0..*	Work
Customer	1..1	has	0..*	ExistingLoan
Customer	1..1	owns	0..*	CreditCard
Customer	1..1	submits	1..1	LoanApplication
LoanDocumentation	1..1	contains	1..*	Document
LoanDocumentation	1..1	produces	1..1	UnderwritingResult
UnderwritingResult	1..1	affects	1..1	LoanApplication
LoanApplication	1..1	associatedwith	0..1	Disbursement
LoanApplication	1..1	involves	0..*	Repayment

### 3.3.2 DOMAIN

Attribute	Domain
branchNo	B001-B999
street	Street in the Philippines
barangay	Barangay in the Philippines
city	City in the Philippines
province	Province in the Philippines
zipCode	000-9999
staffNo	Manager : BM00000-BM99999 Underwriter : UW00000-UW99999 Loan Processor : LP00000-LP99999 Loan Officer : LO00000-LO99999
sex	Male, Female
position	Branch Manager, Underwriter, Loan Processor, Loan Officer
customerNo	First 4 char : year first applied Fifth char : “-“ or dash Last 5 char: 00000-99999
civilStatus	Single, Married, Widowed, Divorced/Separated, Living Together
documentationNo	0000-000 to 9999-999
ownership	Owned, Parents, Mortgaged, Relatives, Rented
sourceOfIncome	Employment, Business
type	Government, Private, Self-employed
monthlyIncome	1-999999
outstandingBal	1-1180000
monthlyPayment	1-999999
CCType	Current, Savings, Payroll, Credit Card
creditLimit	1-2000000
verStatus	Verified, Pending, Unverified
resultNo	A0000-Z9999
result	Approved, Rejected, Suspended
estimatedTotalPayment	1-1180000
interestRate	0.1-0.12
penaltyRate	0.1-0.06
applicationNo	A00000-Z99999
termLoan	6 mos, 12 mos, 18 mos, 24 mos, 48 mos, 60 mos, others
amount	1-1000000
repaymentNo	First 3 char : RPY Fourth char : number of repayment Fifth char : “-“ or dash Last 6 char: the application no
penaltyAmount	1-90000
totalAmount	1-999999
paymentMode	Cash, Digital

### 3.3.3 Relational Schema

<p><b>Branch</b> (branchNo, street, barangay, city, province, zipCode)  <b>Primary Key</b> branchNo</p>	<p><b>Staff</b> (staffNo, fName, lName, street, barangay, zipCode, contactNo, DOB, sex, emailAddress, position, branchNo)  <b>Primary Key</b> staffNo  <b>Foreign Key</b> branchNo <b>references</b> Branch(branchNo)</p>
<p><b>Customer</b> (customerNo, fName, lName, sex, nationality, DOB, SSS/GSIS/UMIDNo, TIN, civilStatus, contactNo, emailAddress)  <b>Primary Key</b> customerNo</p>	<p><b>LoanDocumentation</b> (documentationNo, verStatus, staffNo)  <b>Primary Key</b> documentationNo  <b>Foreign Key</b> staffNo <b>references</b> Staff(staffNo)</p>
<p><b>Home</b> (customerNo, street, barangay, city, province, zipCode, ownership, LOS)  <b>Foreign Key</b> customerNo <b>references</b> Customer(customerNo)</p>	<p><b>Work</b> (customerNo, sourceOfIncome, work, type, employer/orgName, street, barangay, city, zipCode, LOS, officeContactNo, monthlyIncome)  <b>Foreign Key</b> customerNo <b>references</b> Customer(customerNo)</p>
<p><b>ExistingLoan</b> (customerNo, financialInstitution, outstandingBal, typeOfLoan, montlyPayment)  <b>Foreign Key</b> customerNo <b>references</b> Customer(customerNo)</p>	<p><b>CreditCard</b> (customerNo, issuer, CCType, creditLimit, cardNo, dateIssued)  <b>Foreign Key</b> customerNo <b>references</b> Customer(customerNo)</p>
<p><b>Document</b> (documentNo, typeOfDocument, customerNo, staffNo, documentationNo)  <b>Primary Key</b> documentNo  <b>Foreign Key</b> customerNo <b>references</b> Customer(customerNo)  <b>Foreign Key</b> staffNo <b>references</b> Staff(staffNo)  <b>Foreign Key</b> documentationNo <b>references</b> LoanDocumentation(documentationNo)</p>	<p><b>UnderwritingResult</b> (resultNo, result, resultDate, monthlyPayment, estimatedTotalPayment, interestRate, penaltyRate, documentationNo)  <b>Primary Key</b> resultNo  <b>Foreign Key</b> documentationNo <b>references</b> LoanDocumentation(documentationNo)</p>
<p><b>LoanApplication</b> (applicationNo, termLoan, amount, date, purpose, prefBank, resultNo, staffNo, customerNo)  <b>Primary Key</b> applicationNo  <b>Foreign Key</b> resultNo <b>references</b> UnderwritingResult(resultNo)  <b>Foreign Key</b> staffNo <b>references</b> Staff(staffNo)  <b>Foreign Key</b> customerNo <b>references</b> Customer(customerNo)</p>	<p><b>Disbursement</b> (accountNo, date, amount, applicationNo)  <b>Primary Key</b> accountNo  <b>Foreign Key</b> applicationNo <b>references</b> LoanApplication(applicationNo)</p>



<b>Repayment</b> (repaymentNo, scheduledDate, monthlyPayment, penaltyAmount, totalAmount, paymentMode, dateReceived, applicationNo) <b>Primary Key</b> repaymentNo <b>Foreign Key</b> applicationNo <b>references</b> LoanApplication(applicationNo)	
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### 3.3 TRANSFORMATION OF ERDS TO NORMALIZED RELATIONS

#### ALREADY NORMALIZED RELATIONS

##### Branch

branchNo	address
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##### Staff

staffNo	name	address	contactNo	DOB	sex	emailAddress	position
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##### UnderwritingResult

resultNo	result	resultDate	monthlyPayment	estimatedTotalPayment	interestRate	penaltyRate
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##### LoanApplication

applicationNo	termLoan	amount	date	purpose	prefBank
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##### Disbursement

accountNo	date	amount
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##### Repayment

repaymentNo	scheduledDate	monthlyPayment	penaltyAmount	totalAmount	paymentMode	dateReceived
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**1NF****Customer**

customerNo	name	homeAddress	ownership	LOS	sex	nationality	DOB	SSS/GSIS/UMIDNo	TIN
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Continuation

civilStatus	contactNo	emailAddress	sourceOfIncome	work	wType	employer/orgName	wAddress
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Continuation

wLOS	officeContactNo	monthlyIncome	CCIssuer	CCType	creditLimit	cardNo	dateIssued
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Continuation

financialInstitutionEL	outstandingBal	typeOfLoan	montlyPayment
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**ALTERNATIVE 1NF****Customer**

customerNo	name	sex	nationality	DOB	SSS/GSIS/UMIDNo	TIN	civilStatus	contactNo	emailAddress
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**Home**

homeAddress	ownership	LOS
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**Work**

sourceOfIncome	work	type	employer/orgName	wAddress	wLOS	officeContactNo	monthlyIncome
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**ExistingLoan**

financialInstitutionEL	outstandingBal	typeOfLoan	montlyPayment
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**CreditCard**

CCIssuer	CCType	creditLimit	cardNo	dateIssued
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**Revisions**

- wType attribute in work relation is changed to type.
- wAddress attribute in work relation is changed to address.
- wLOS attribute in work relation is changed to LOS.
- financialInstitutionEL attribute in ExistingLoan is changed to financialInstitution.

Alternative approach of 1NF is used on this relation where the repeating data is place along with a copy of the original key attributes, in a separate relation. This approach also normalized into the same set of 3NF relations.

### 1NF

#### LoanDocumentation

documentationNo	documentVerStatus	typeOfDocument	documentNo
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FD1     documentationNo  $\rightarrow$  documentVerStatus, typeOfDocument, documentNo

(Primary Key)

FD2     documentNo  $\rightarrow$  typeOfDocument

(Transitive Dependency)

### 2NF

#### LoanDocumentation

documentationNo	documentVerStatus
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#### Document

documentNo	typeOfDocument
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