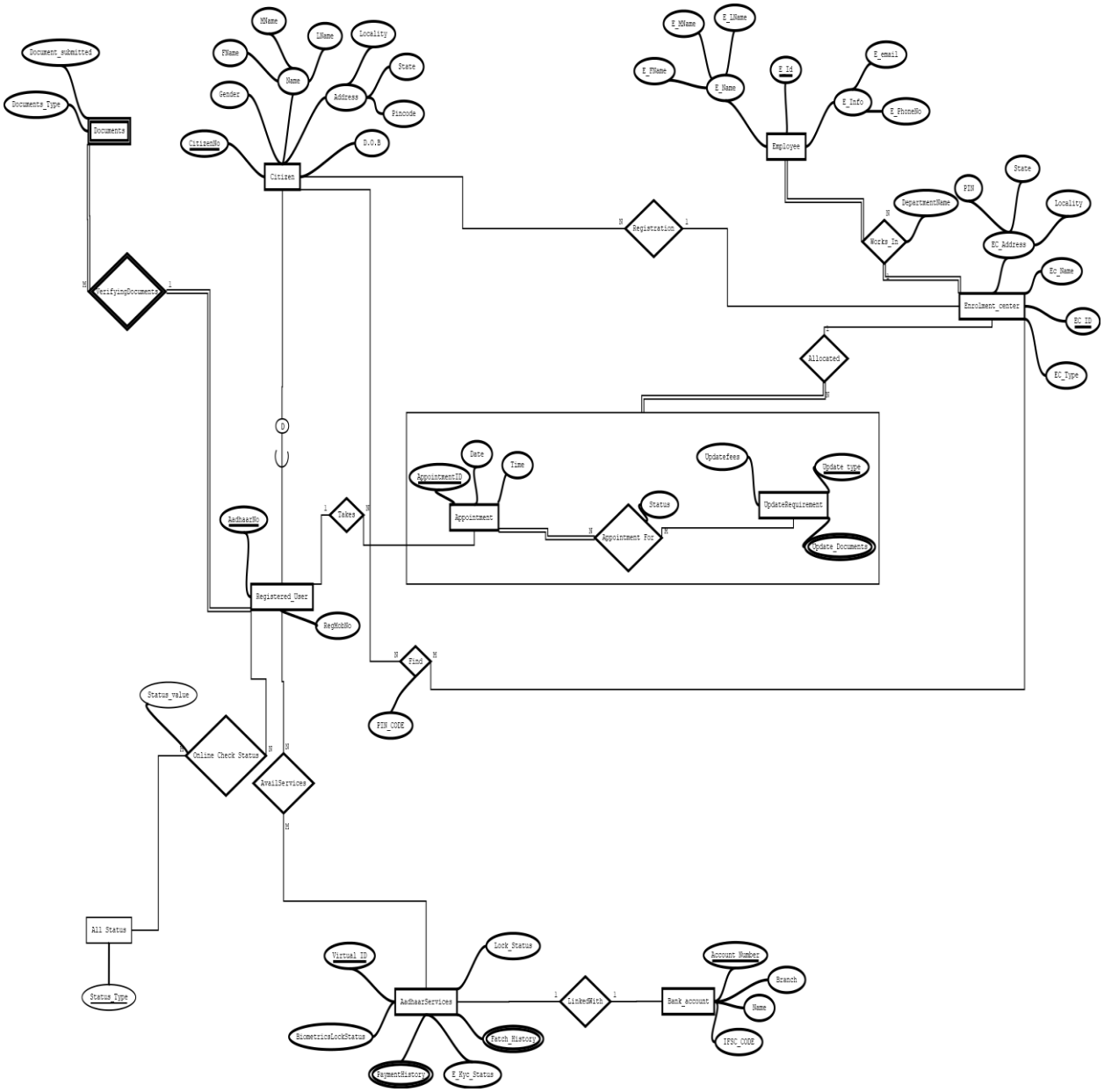
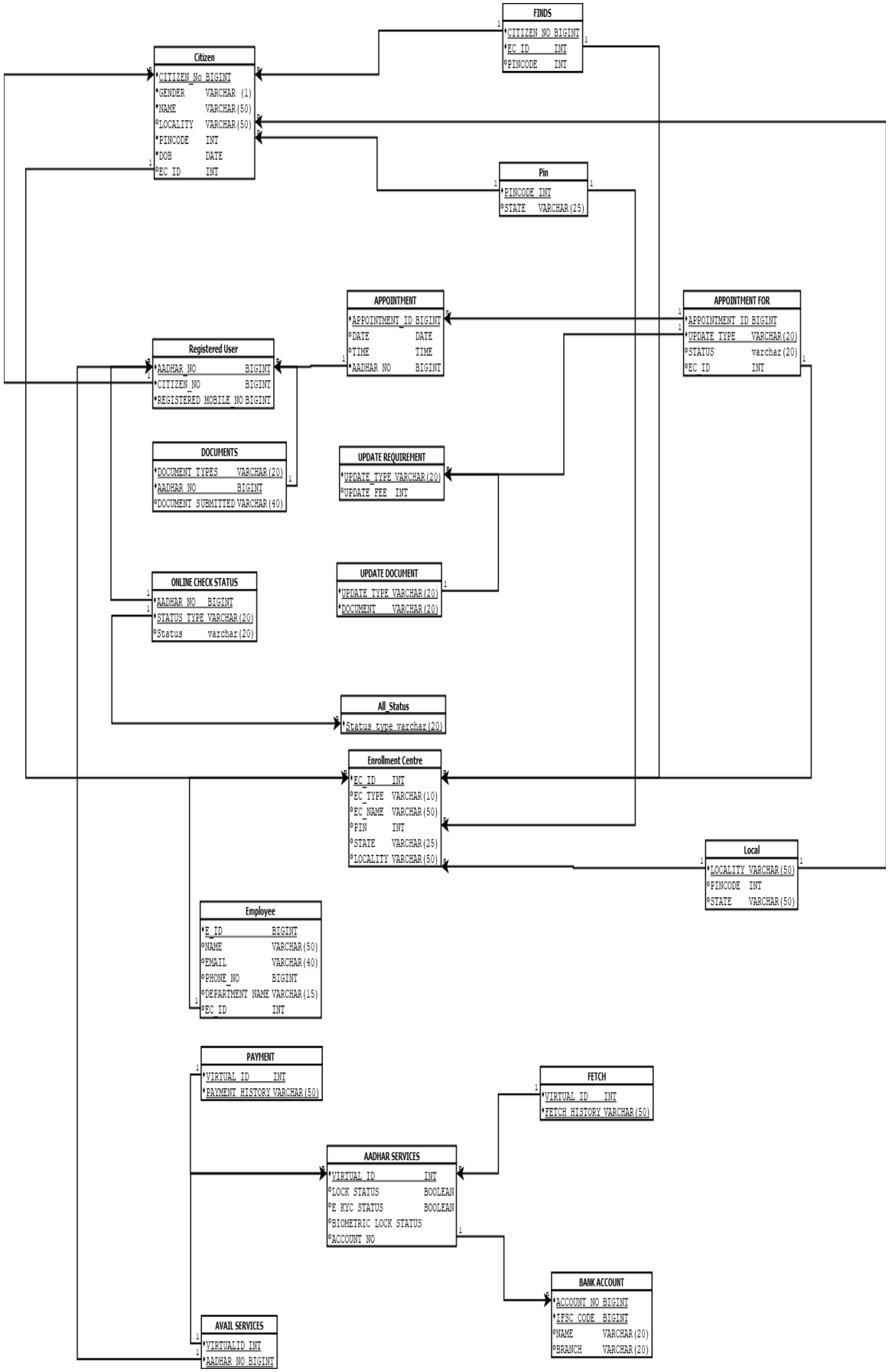
DATA BASE MANAGEMENT PROJECT

Entity-Relationship Diagram



Relational Diagram



FUNCTIONAL DEPENDENCIES AND NORMALIZATION

- **Citizen**
  Attributes – Citizen (CitizenNo, Gender, Fname, Mname, Lname, Locality, State, Pincode, Dob,EC_ID)

- **Minimal Functional Dependencies Set**
  CitizenNo ->Fname
  CitizenNo -> Gender
  CitizenNo ->Mname
  CitizenNo ->Lname
  CitizenNo -> Locality
  CitizenNo -> State
  CitizenNo -> Pincode
  CitizenNo -> DOB
  CitizenNo -> EC_ID
  Pincode -> State
  Locality -> Pincode
  Locality -> State

  Let find closure of CitizenNo
  CitizenNo+ = {CitizenNo,Gender,Fname
  ,Mname,Lname,Locality,State,Pincode,DOB,EC_ID}
  Since its closure include all attribute of Citizen relation , therefor CitizenNo is Primary Key.

  Last 3 functional dependencies does not have super-key on left side of FD hence the given relation is not in BCNF, it is 2NF. We can decompose it into BCNF by having 3 relation as following
  R1(CitizenNo,Gender,Fname ,Mname,Lname, DOB,EC_ID)
  R2(Pincode,State)
  R3(Locality,Pincode,State)

- **Enrollment Centre**
  Attributes – Enrollment Centre
  (EC_ID,EC_Type,EC_Name,Pincode,State,Locality)

- **Minimal Functional Dependencies Set**
  EC_ID -> EC_Name
  EC_ID -> EC_Type
  EC_ID -> Pincode
  EC_ID -> State
  EC_ID -> Locality
  Pincode -> State
  Locality -> Pincode
  Locality -> State

  Let find closure set of EC_ID
  EC_ID+ = {EC_ID , EC_Name ,EC_Type,Pincode,State,Locality}
  Since it involves all attributes of Enrollment Centre relation it is Primary Key.

  Last 3 functional dependencies does not have super-key on left side of FD hence the given relation is not in BCNF, it is 2NF. We can decompose it into BCNF by having 3 relation as following
  R1(EC_ID , EC_Name ,EC_Type)
  R2(Pincode,State)
  R3(Locality,Pincode,State)

- **Finds**
  Attribute – Finds(CitizenNo ,EC_ID, Pincode)
- **Minimal Functional Dependencies Set**
  {CitizenNo, EC_ID} - > Pincode

  Primary Key is {CitizenNo , EC_ID}.
  Relation is in BCNF as super-key is present on left side of FD.

- **Appointment For**

Attributes – Appointment For (AppointmentID , UpdateType, Status , EC_ID)

- **Minimal Functional Dependencies Set**
  {AppointmentID , UpdateType} - > Status
  {AppointmentID , UpdateType} - > EC_ID

  Primary Key is {AppointmentID , UpdateType} as it determines all attribute of given relation
  Since primary key is present on left side of all FDs of relation we can say "Appointment For" relation to be in BCNF.

- **Appointment**
  Attribute – Appointment (AppointmentID , Date , Time, AadharNo)
- **Minimal Functional Dependencies Set**
  AppointmentID -> AadharNo
  AppointmentID -> Date
  AppointmentID -> Time

  Primary Key is AppointmentID as it determines all other attribute of relation. Relation is in BCNF as all FD has AppointmentID on left side of its FD's.

- **Registered User**
  Attribute – Registered User (AadharNo , CitizenNo , RegisteredMobileNo)
- **Minimal Functional Dependencies Set**
  AadharNo - > CitizenNo
  AadharNo -> RegisteredMobileNo

  Primary Key is AadharNo as it determines all other attribute of relation. Relation is in BCNF as all FD has AadharNo on left side of its FD's.

- **Documents**
  Attributes – Documents (DocumentType , AadharNo , DocumentSubmitted)
- **Minimal Functional Dependencies Set**
  {DocumentType , AadharNo} -> DocumentSubmitted

  Primary Key is {DocumentType , AadharNo} as it determines all other attribute of relation. Relation is in BCNF as all FD has {DocumentType , AadharNo} on left side of its FD's.

- **Employee**
  Attribute – Employee
  (E_ID,Name,Email,PhoneNo,DepartmentName,EC_ID)
- **Minimal Functional Dependencies Set**
  E_ID->Name
  E_ID -> Email
  E_ID->PhoneNo
  E_ID ->DepartmentName
  E_ID - >EC_ID

  Primary Key is E_ID as it determines all other attribute of relation. Relation is in BCNF as all FD has E_ID on left side of its FD's.

- **Aadhar Services**
  Attribute – Aadhar Services(VirtualID, LockStatus, EKYCStatus,BiometricLockStatus,AccountNo,FetchHistory(multivalue),PaymentHistory(multivalue))
- **Minimal Functional Dependencies Set**
  VirtualID -> LockStatus
  VirtualID -> EKYCStatus
  VirtualID -> BiometricLockStatus
  VirtualID -> AccountNo
  VirtualID- >> FetchHistory
  VirtualID ->> PaymentHistory

  Primary Key is VirtualID as its closure include all attribute of relation. However the relation is not in BCNF due to presence of multivalue

dependencies such as FetchHistory and PaymentHistory.Since this multivalue dependencies are independent of each other we can so we decompose the given relation into 3 new relation as following
R1 (VirtualID, LockStatus, EKYCStatus,BiometricLockStatus,AccountNo)
R2 (VirtualID , PaymentHistory)
R3 (VirtualID , FetchHistory)
Now relation is in 4NF.

- **BankAccount**
  Attribute – BankAccount (AccountNo , IFSCCode , Name,Branch)
- **Minimal Functional Dependencies Set**
  IFSCCode - >Name
  IFSCCode -> Branch

  Primary Key is {AccountNo ,IFSCCode} as its closure include all attributes of relation. Relation is in BCNF.

- **Online Check Status**
  Attribute – Online Check Status (AadharNo , StatusType,Status)
- **Minimal Functional Dependencies Set**
  {AadharNo,StatusType} -> Status

  {AadharNo , StatusType} together form composite primary key as it closure include all attribute of relation. The relation above is in BCNF as primary key is present on left of above FD.

- **Update Requirement**
  Attribute – Update Requirement(Update Type , Update Fee)
- **Minimal Functional Dependencies Set**
  Update Type -> Update Fee

  Update Type is primary key as it closure include all attribute. The relation is in BCNF as primary key is present on left of above FD

- **Update Document**
  Attribute – Update Document(Update Type , Document)

Update Type and Document together form composite primary key hence there is no FD and table is in BCNF

- **All Status**
  Attribute – All Status(StatusType)
  All status have Status Type as it primary key hence no FD is present and thus table is BCNF.

- **Avail Services**
  Attribute – Avail Services(VirtualID , AadharNo)
  Both (VirtualID , AadharNo) form composite primary key and hence relation is in BCNF.