

Relational Schema

1. Artist(artistID:PK, name, biography, style, totalExhibitions)
2. Artwork(artworkID:PK, artistID:FK, title, medium, dimensions, creationDate, price, availabilityStatus)
3. Exhibition(exhibitionID:PK, exhibitionName, startDate, endDate, venue, galleryID:FK)
4. ExhibitionArtworks(exhibitionArtworkID:PK, exhibitionID:FK, artworkID:FK)
5. Gallery(galleryID:PK, galleryName, location, contactDetails)
6. Collector(collectorID:PK, collectorName, preferences)
7. CollectArtworks(collectArtworkID:PK, collectorID:FK, artworkID:FK)

Checking for BCNF

For a relation to be in BCNF: for any non-trivial functional dependency $X \rightarrow Y$, X should be a superkey.

Functional Dependencies

1. $\text{artistID} \rightarrow \text{name, biography, style, totalExhibitions}$
2. $\text{artworkID} \rightarrow \text{title, medium, dimensions, creationDate, price, availabilityStatus, artistID}$
3. $\text{exhibitionID} \rightarrow \text{exhibitionName, startDate, endDate, venue, galleryID}$
4. $\text{galleryID} \rightarrow \text{galleryName, location, contactDetails}$
5. $\text{collectorID} \rightarrow \text{collectorName, preference}$
6. $\text{exhibitionArtworkID} \rightarrow \text{exhibitionID, artworkID}$
7. $\text{collectArtworkID} \rightarrow \text{collectorID, artworkID}$

From the above functional dependencies:

in Artist: artistID is the PK, so it's a superkey

in Artwork: artworkID is the PK, so it's a superkey

in Exhibition: exhibitionID is the PK, so it's a superkey

in Gallery: galleryID is the PK, so it's a superkey

in Collector: collectorID is the PK, so it's a superkey

in ExhibitionArtworks: $\text{exhibitionArtworkID}$ is the PK, so it's a superkey

in CollectorArtworks: collectArtworkID is the PK, so it's a superkey

Given the above, we can conclude that all relations are in BCNF.