

1. Exercise 1: Modeling

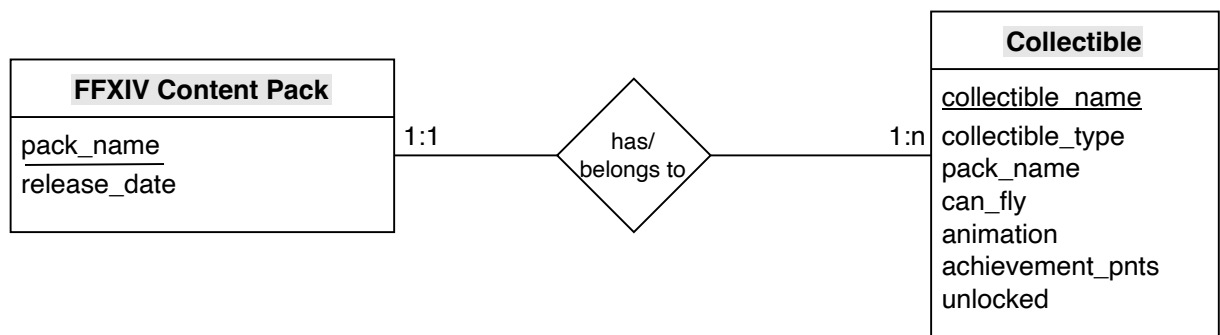
1.1 Problem definition

Information to store from the Final Fantasy XIV online game:

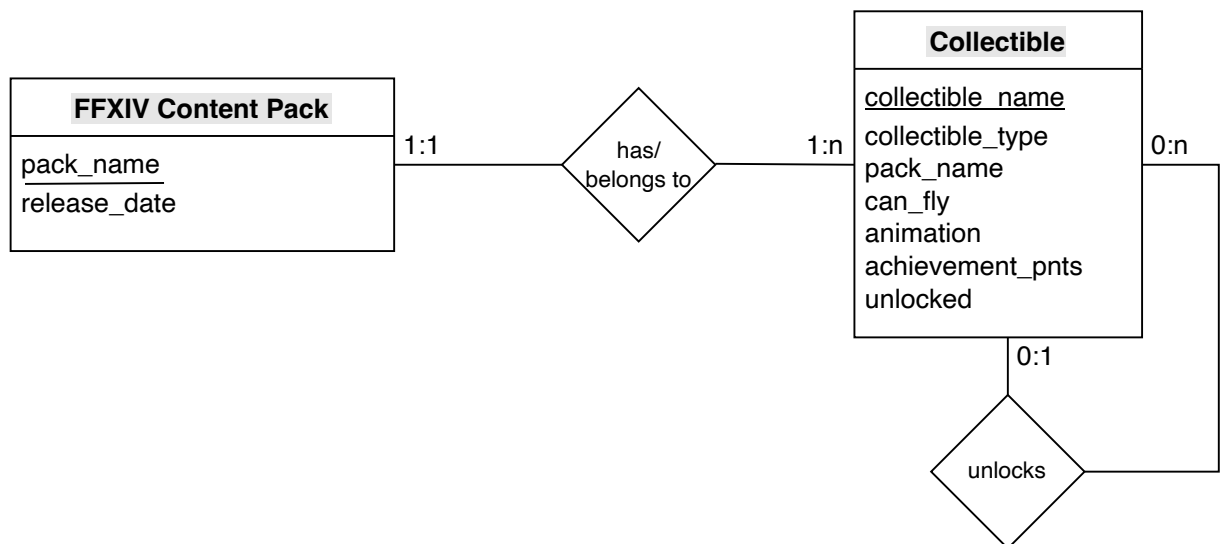
- each collectible belongs to a pack.
- each content pack has unique name and release date.
- each mount collectible has unique name, can fly, pack it belongs to, have been unlocked.
- each minion collectible has unique name, special animation, pack it belong to, have been unlocked.
- each achievement collectible unique name, number of points earned, pack it belongs to, have been unlocked.

1.2 Tasks

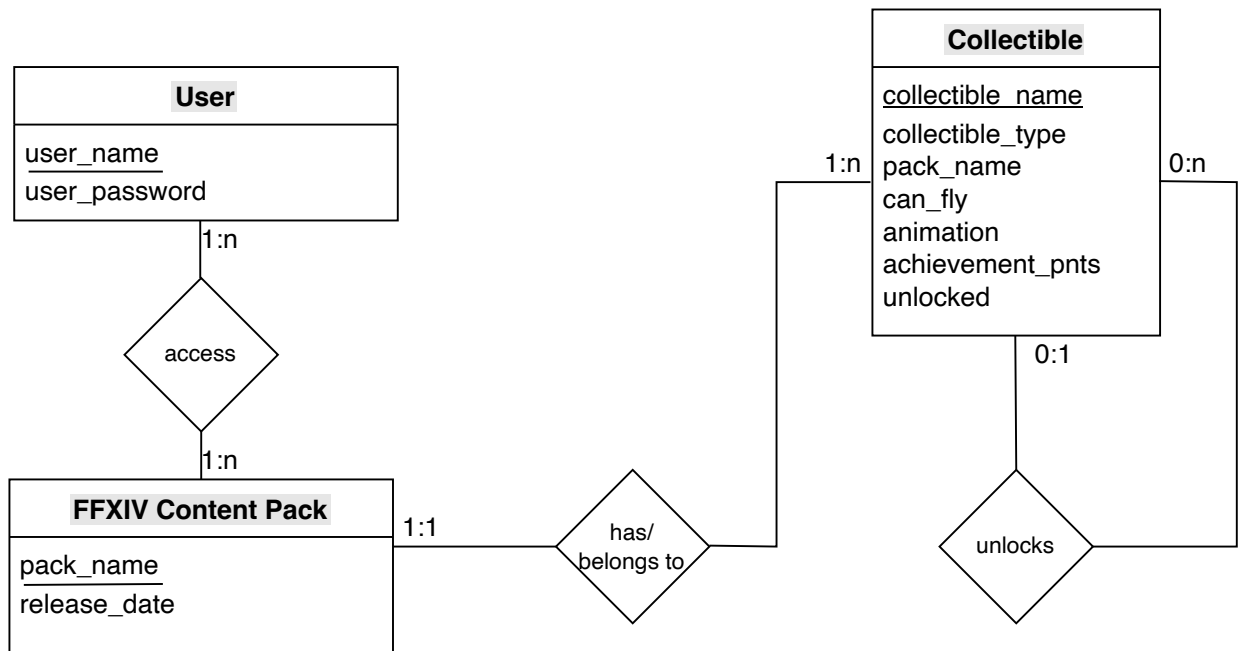
1. Conceptual Model of the DB using Entity-Relationship Diagram



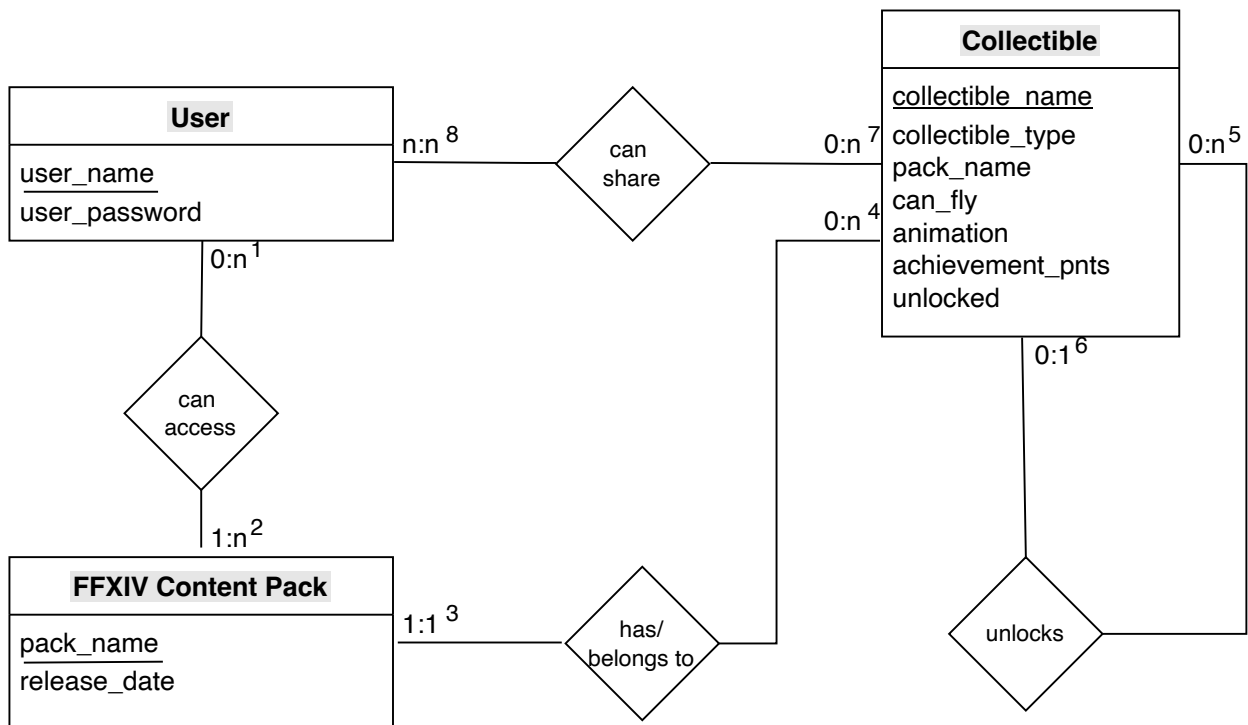
2. Sometimes unlocking an Achievement unlocks Mount



3. Modified ER Model for other players to use DB



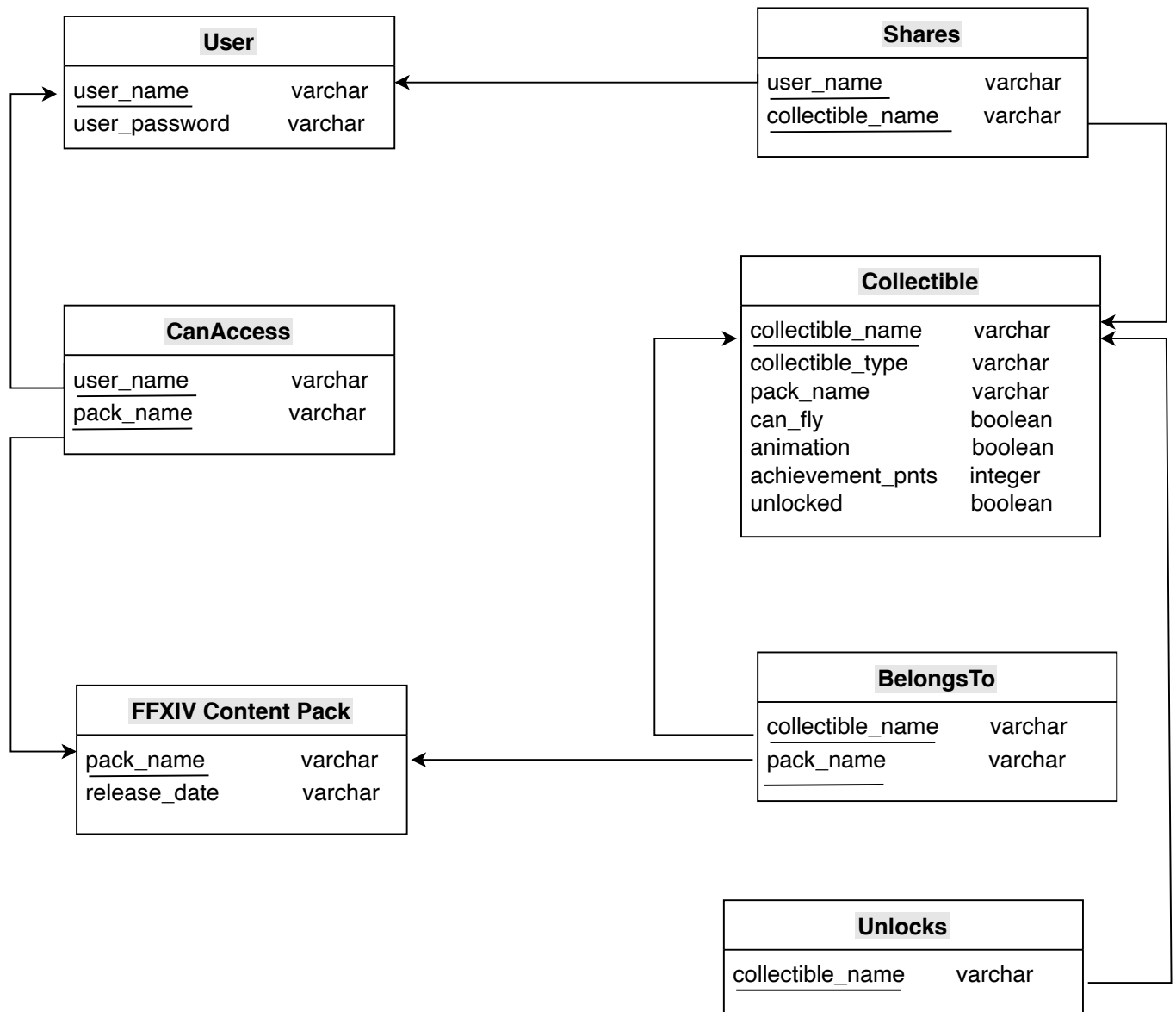
4. Modified ER Model for other players to share collections



Assumptions:

1. A user must at least have a basic pack to access.
2. A pack can exist without a user.
3. A collectible must belong to a pack.
4. A pack can have none to multiple collectibles.
5. A collectible can exist even without being unlocked.
6. A specific collectible can sometimes be unlocked by one specific collectible being unlocked.
7. A user may or may not share collectibles.
8. Collectibles need users to be able to be shared.

5. Physical Relational Model from the ER Model



2. Exercise 2: Normalization

2.1 Problem definition

- each book has: title, author, shelf number, category.
- the library may have multiple copies of the same book but no same title books.
- the library's DB schema: Book(Title, Author, Shelf, Category, Copy_number)

extract from the DB

Book				
Title	Author	Category	Shelf	Copy_number
The Fellowship of the Ring	Tolkien	Fantasy	F10	1
Ulysses	Joyce	Novel	B50	1
The Hitchhiker's Guide to Galaxy	Adams	SciFi	H20	1
The Hitchhiker's Guide to Galaxy	Adams	SciFi	H20	2
Les Misserables	Hugo	Novel	B50	1
Les Misserables	Hugo	Novel	B50	2
Fundamentals of Database System	Elmasri	TextBook	T30	1

2.2 Tasks

1. Non-trivial functional dependencies of the model

- Title --> {Author, Category, Shelf, Copy_number}
- Category --> {Shelf}

2. Is the model in 3NF?

No, it is not in 3NF.

3. Decomposed model. Is it in BCNF?

Book (Title, Author, Category, Copy_number)
Position (Category, Shelf)

The decomposed model is in BCNF because it is in 2NF and no transitive functional dependency.