
















W04 – Database Design Practice

CASE STUDY – Reverse engineering a website into an ERD. To get some practice with taking a system that uses data of some sort and try to figure out how it was designed as a relational database.

Let's use <https://www.churchofjesuschrist.org/music/library/hymns> as an example.

<input checked="" type="checkbox"/>	8. Awake and Arise	8	
<input checked="" type="checkbox"/>	9. Come, Rejoice	9	
<input checked="" type="checkbox"/>	10. Come, Sing to the Lord	10	
<input checked="" type="checkbox"/>	11. What Was Witnessed in the Heavens?	11	
	12. 'Twas Witnessed in the Morning Sky*	12	
<input checked="" type="checkbox"/>	13. An Angel from on High	13	
<input checked="" type="checkbox"/>	14. Sweet Is the Peace the Gospel Brings	14	
	15. I Saw a Mighty Angel Fly*	15	
<input checked="" type="checkbox"/>	16. What Glorious Scenes Mine Eyes Behold	16	
<input checked="" type="checkbox"/>	17. Awake, Ye Saints of God, Awake!	17	
<input checked="" type="checkbox"/>	18. The Voice of God Again Is Heard	18	
<input checked="" type="checkbox"/>	19. We Thank Thee, O God, for a Prophet	19	
<input checked="" type="checkbox"/>	20. God of Power, God of Right	20	
<input checked="" type="checkbox"/>	21. Come, Listen to a Prophet's Voice	21	
<input checked="" type="checkbox"/>	22. We Listen to a Prophet's Voice	22	
<input checked="" type="checkbox"/>	23. We Ever Pray for Thee	23	
<input checked="" type="checkbox"/>	24. God Bless Our Prophet Dear	24	
<input checked="" type="checkbox"/>	25. Now We'll Sing with One Accord	25	

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What entities might be used in the database that is supplying the information for this web page?

- The hymns themselves
- The author/composer of the hymns
- Topics of the hymns
- You could also include meter of the hymn but I'm not going to take it that far.

What are some of the attributes that would fit within each entity?

(Remember the attributes are not the same as values. An attribute would be 'title'. Every hymn has the attribute of title. And then later when we insert values into a table; one row's value for title would be something like 'The Morning Breaks'. We are only interested in attributes right now, not the values.)

- hymns
 - title
 - first_line
 - number

- author/composer
 - last_name
 - first_name
- topic
 - topic_name

There might be more entities like scriptures that go with the hymns, etc. There could also have been more attributes like the years each author/composer was born and died in addition to their names, but I'm going to just focus on these 3 entities with these attributes for now to keep it simple. You can do the same and keep it simple when you reverse engineer an ERD for your homework this weekend.

What data type would be used for each attribute?

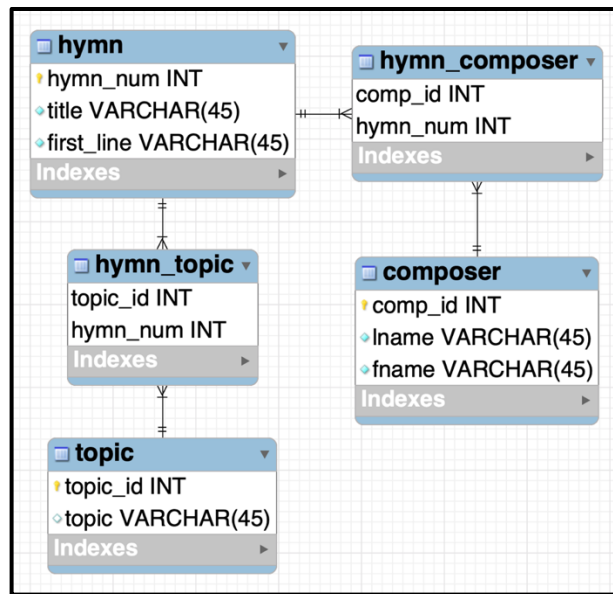
- hymns
 - title **VARCHAR(45)**
 - first_line **VARCHAR(45)**
 - number **INT**
- author/composer
 - last_name **VARCHAR(30)**
 - first_name **VARCHAR(30)**
- topic
 - topic_name **VARCHAR(20)**

How could the entities be related?

Let's look at the relationship between the hymns and the composers. Each hymn might have one or more composers and each composer may have composed one or more hymns. That's a many-to-many relationship. For example, the hymn "An Angel from on High" was written and composed by Parley P. Pratt and John E. Tullidge. Parley P. Pratt also wrote a number of other songs as well.

Let's look at the relationship between the hymn and the topic. Each hymn could have one or more topics associated with it and each topic could belong to one or more hymns. For example the hymn "An Angel from on High" is associated with the topics 'Book of Mormon', "Gathering of Israel", and 'Restoration of the Gospel'. But these topics could also be used for other songs as well. For example, "Israel, Israel, God is Calling" is also listed under the topic of "Gathering of Israel". So that one topic can have many hymns associated with it.

So here is the ERD that would fit with this data. Notice I have added a primary key for each of the 3 main entities. Hymn number seemed like a good primary key for the hymns.



The many-to-many relationships were resolved down to 2 one-to-many relationships automatically in Workbench as the ERD was created. The two linking tables contain a composite key with a primary key from each table.

You will do something similar for your homework this weekend; visiting any website and creating an ERD from the data you see there. It doesn't have to be perfect. I know for a fact that the real database used for the churchofjesuschrist.org hymn site was probably much more complex and had many more entities and attributes. But as long as you give it your best shot of how you think it is design, you will be good.

Again, don't confuse what you place in the ERD with values that will come later when inserting data into the database. At this point we are just designing, not placing values. Later the hymn table might look something like the image below, but this is later, not this week. For the ERD you create this week we are focusing on the column headers below (the attributes), not the actual values. Your ERD will look more like the previous entity relationship diagram image.

hymn_num	title	first_line
1	The Morning Breaks	The morning breaks, the shadows flee
2	The Spirit of God	The Spirit of God like a fire is burning!
3	Now Let Us Rejoice	Now let us rejoice in the day of salvation
4	Truth Eternal	Truth eternal, truth divine