Content Databases

Adding context to build smarter apps and content creations.

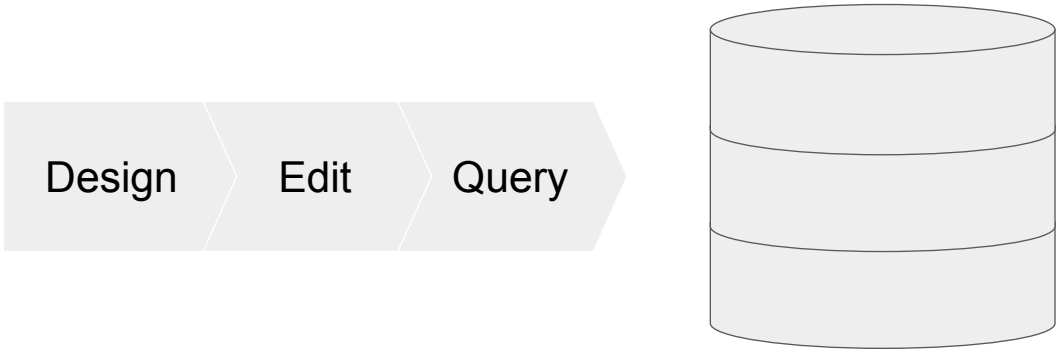
Cathy Burley

webCOMAND

We are here today to talk about Content Databases, as used in our PaaS called webCOMAND.

webCOMAND

Platform to design, edit and query **Content Databases**.



webCOMAND is used to..

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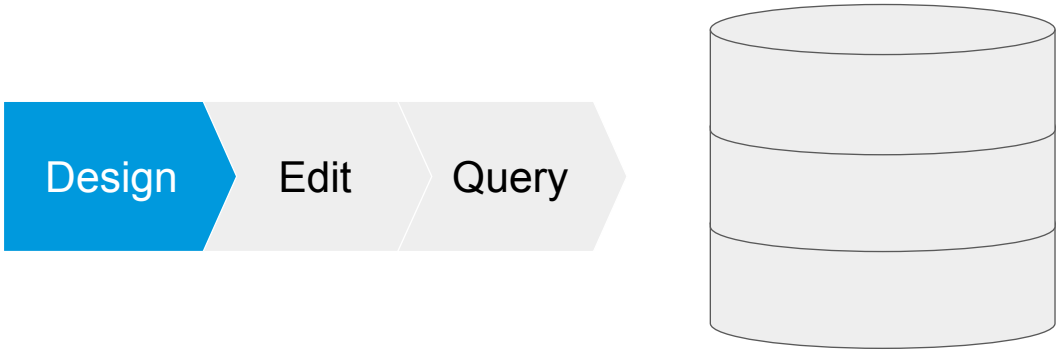

design,

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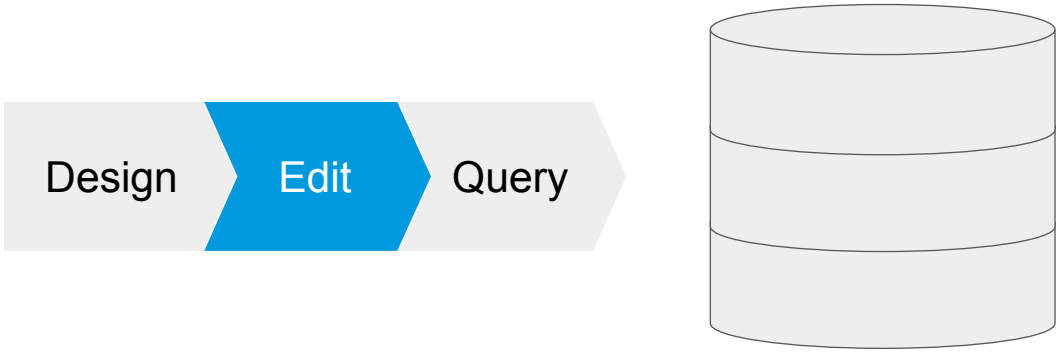

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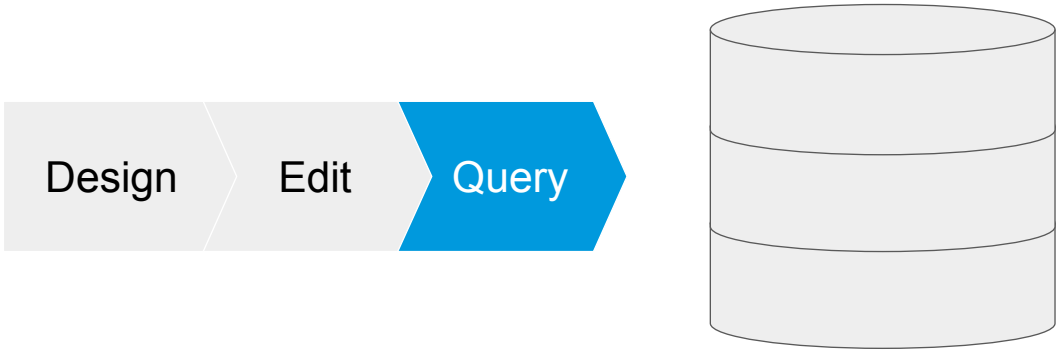

and query...

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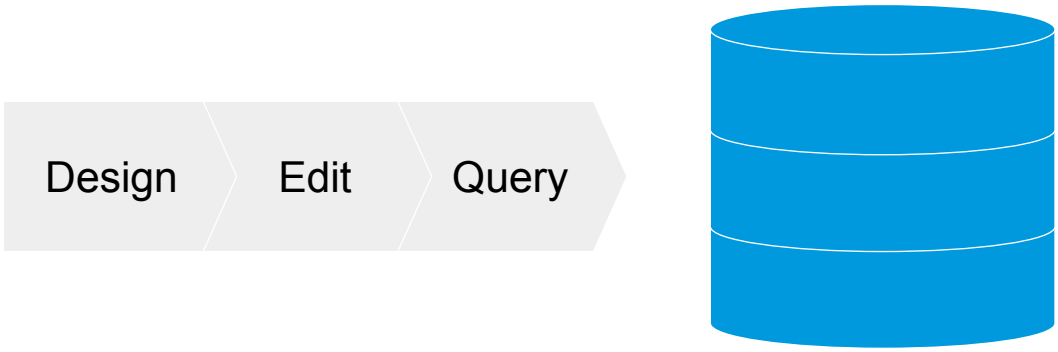


content databases.

What is a Content Database?

Content Database?

So, what is a content database?

What is a Content Database?

Content = ?

Content Database?

And more specifically, what is content?

What is a Content Database?

Content = Data + Context

Content Database

Content is Data + Context
Data can be anything from products in a catalog to articles in a blog post.
Context is structured “intelligence” around the data that makes it easier for developers and content creators to build better systems.

What is a Content Database?

Content = Data + Context

Content Database

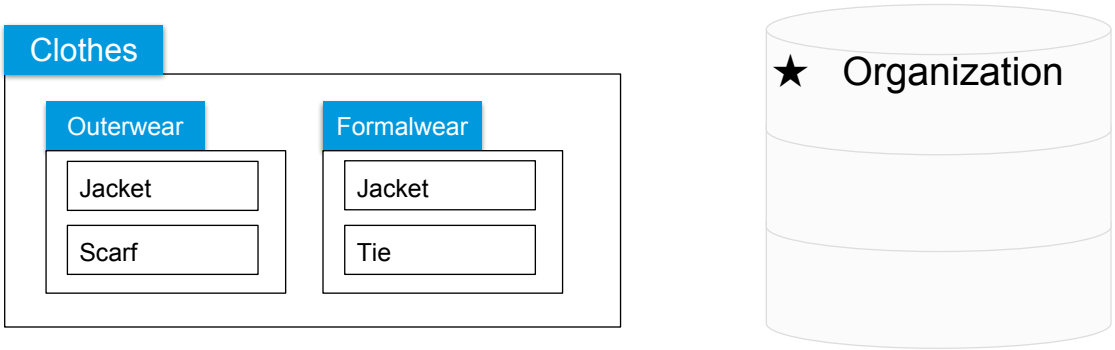
Products			
ID	Title	Price	...
1	Jacket	$400	
2	Scarf	$60	
3	Tie	$50	

For example, a database is typically just rows in a table.
Here we have Products in a Product Catalog, with one row for each product.

What is a Content Database?

Content = Data + Context

Content Database

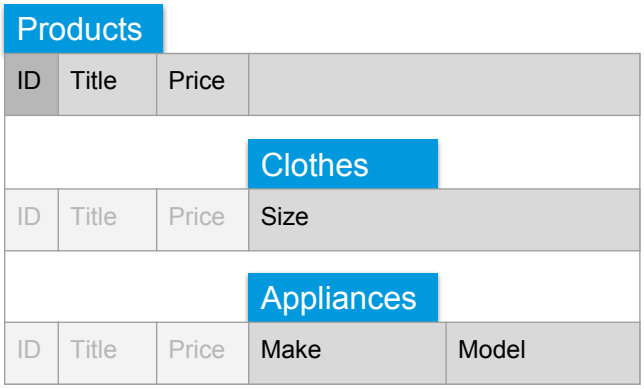


However, instead of just tables, it is often very helpful to organize content into folders and categories. This makes it easier to manage a system with a lot of products. This can make it easier for our clients to maintain as well. We can always implement these ourselves with reference tables and foreign keys, but these don't come out of the box with a traditional database.

What is a Content Database?

Content = Data + Context

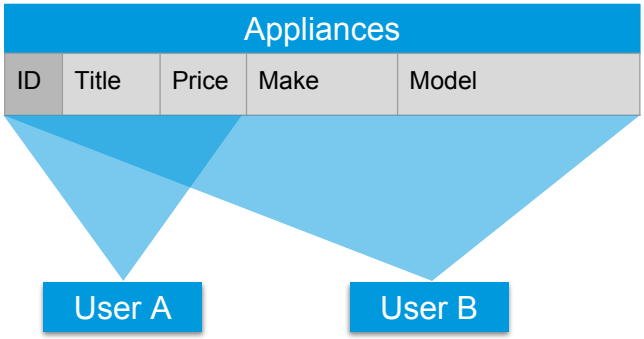
Content Database



It is also helpful to organize content into hierarchies, where we can reuse some fields and customize others. For example, Products might define common fields like Title and Price, whereas Clothes have sizes and Appliances have makes/models. They all share the same Title/Price fields though.

What is a Content Database?

Content = Data + Context

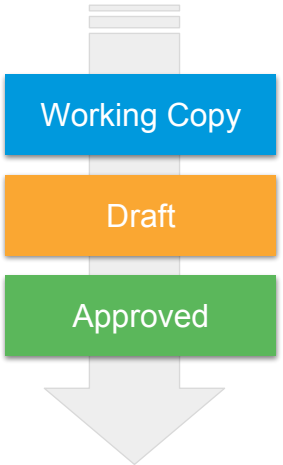


Content Database

Content often requires very fine-grained authorizations, where users may only have access to certain fields, or specific products. We may also want to limit access based on Folders. Traditional databases are typically limited where you can only control access by table.

What is a Content Database?

Content = Data + Context

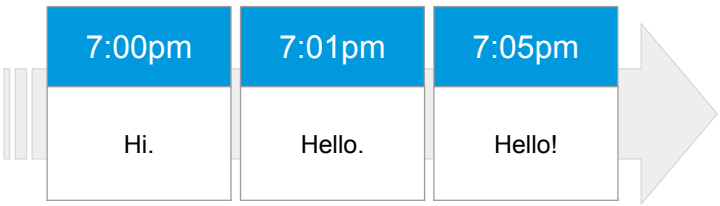


Content Database

Content can also exist in different stages, which is helpful in companies that want a structured workflow for what ends up in their systems. Users may collaborate on a the description of a product for example, and which may enter a DRAFT mode for review before being APPROVED for release to a website, app, or print publication.

What is a Content Database?

Content = Data + Context



Content Database

Revisions are also important in many systems in order to keep a history of those product descriptions for reference, comparison, rollback, or undo.

What is a Content Database?

Content = Data + Context

	English	French
Prospect	Hello!	Bonjour!
Customer	Welcome back.	Nous saluons le retour.

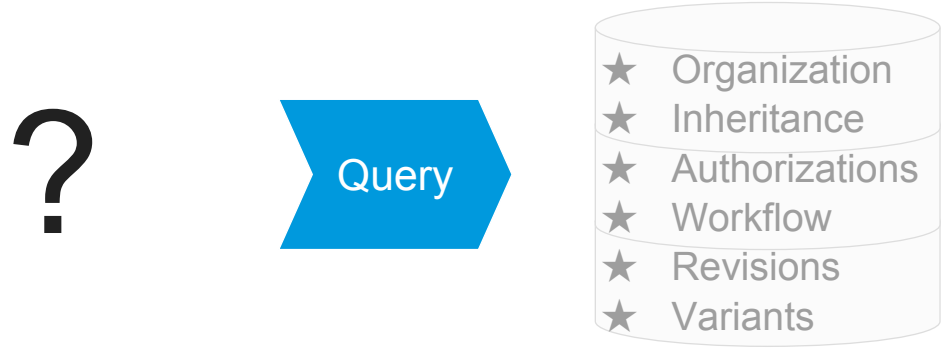
Content Database

Finally, content may also need to vary depending on where, when, and how it is viewed. It may need to be translated into different languages, or be presented in a specific way for different types of clients or market segments.

Content Database Queries

Content = Data + Context

Content Database



In our experience, these types of context are common requests for lots of applications, not just for product catalogs.
However, these features don't come with most traditional databases out of the box. So, how can we transform a traditional SQL database into a content database, and how can we perform "context aware queries"?

Content Database Queries

Content = Data + Context

Products			
ID	Title	Price	...
1	Jacket	$400	
2	Scarf	$60	
3	Tie	$50	

Content Database

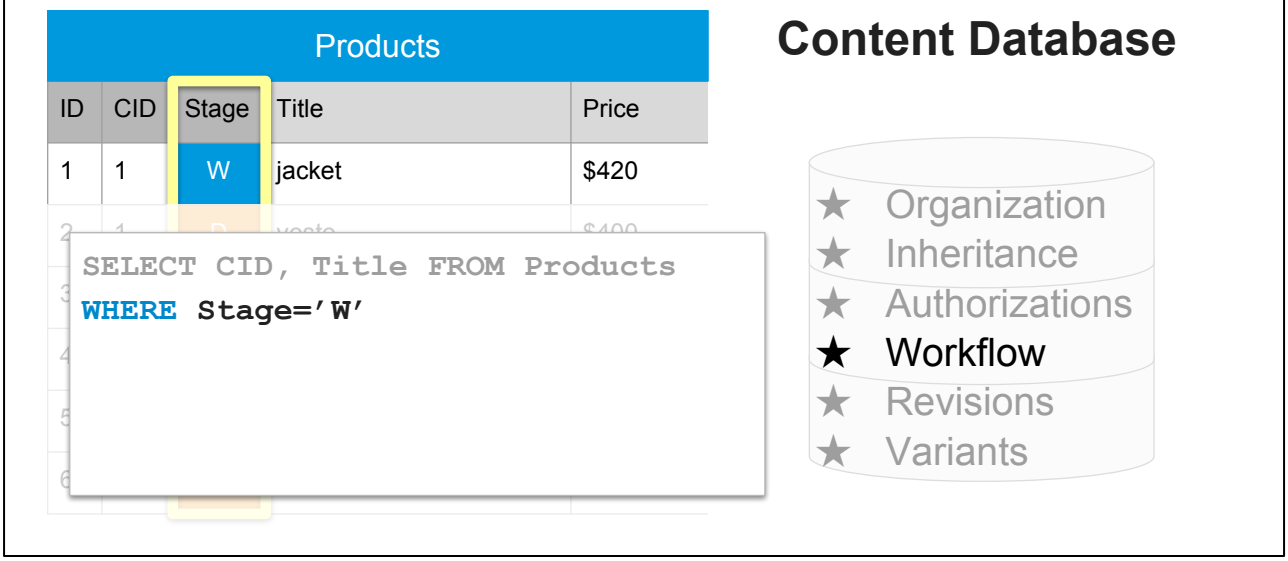
Well, let's look at that products table again and add columns to see what a "contextual SQL query" might look like.

Content Database Queries

Products			
ID	CID	Title	Price
1	1	jacket	$420
2	1	veste	$400
3	1	Jacket	$400
4	1	Veste	$400
5	2	Scarf	$60
6	3	Tie	$50

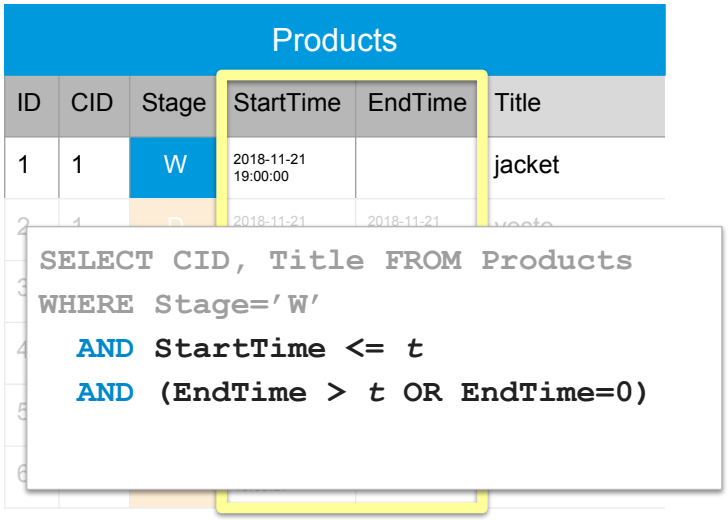
First, you will notice that we need a lot more rows in our products table. This allows us to represent the different workflow stages, revisions, and variants for a single product. We also introduce a “Content ID” column that uniquely identifies a product, as opposed to the ID column which points to a single product row.

Content Database Queries



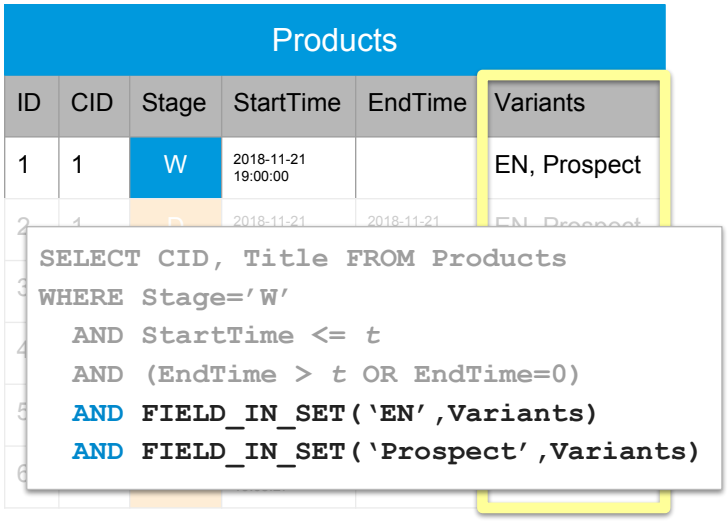
Next we add a column to represent the workflow stage, which can be used to narrow our query down to just the one we are interested in.

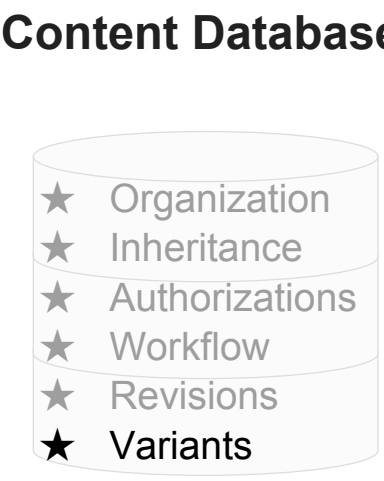
Content Database Queries



We can add revisions to our table with two new columns that record the lifespan of each row. We then can query for a specific revision of a Product based on a point in time, or get the “latest” revision that has an EndTime of 0.

Content Database Queries





For variants we can add another column that represents the translated language and type of end user, such as “English” and “Prospective Customers”

Content Database Queries

Products					
ID	CID	Stage	StartTime	EndTime	Variants
1	1	W	2018-11-21 19:00:00		EN, Prospect

```
SELECT CID, Title FROM Products
WHERE Stage='W'
  AND StartTime <= t
  AND (EndTime > t OR EndTime=0)
  AND FIELD_IN_SET('EN',Variants)
  AND FIELD_IN_SET('Prospect',Variants)
```

Content Database

- ★ Organization?
- ★ Inheritance?
- ★ Authorizations?
- ★ Workflow
- ★ Revisions
- ★ Variants

So as you can see this query is becoming pretty complex, and this only scratches the surface. We haven't even touched on Organization, Inheritance, or Authorizations yet. Queries like this, with all of these clauses, are difficult to write and hard to maintain. A content database needs to provide tools to make "contextual queries" easier to write.

Content Database Queries

Products					
ID	CID	Stage	StartTime	EndTime	Variants
1	1	W	2018-11-21 19:00:00		EN, Prospect

```
SELECT CID, Title
FROM Products+
IN /Clothes/Outerwear
WITH EN, Prospect
WHERE Price < 100
```

Content Database

- ★ Organization
- ★ Inheritance
- ★ Authorizations
- ★ Workflow
- ★ Revisions
- ★ Variants

This query here is a bit simpler. It looks like an SQL query, but introduces a few new clauses to support contexts that we have talked about. It's much easier for developers to write, and less-technical clients can be trained to generate their own reports when queries are this simple too.

Content Database Queries

Products					
ID	CID	Stage	StartTime	EndTime	Variants
1	1	W	2018-11-21 19:00:00		EN, Prospect

```
SELECT CID, Title
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Content Database

- ★ Organization
- ★ Inheritance
- ★ Authorizations
- ★ Workflow
- ★ Revisions
- ★ Variants

We can support inheritance by introducing a “+” to Products - this means to include all types of products, including clothing and appliances.

Content Database Queries

Products					
ID	CID	Stage	StartTime	EndTime	Variants
1	1	W	2018-11-21 19:00:00		EN, Prospect

```
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Content Database

- ★ Organization
- ★ Inheritance
- ★ Authorizations
- ★ Workflow
- ★ Revisions
- ★ Variants

The new IN clause lets us use our content organization and specify a folder to search in. Only products organized into this folder will be returned.

Content Database Queries

Products					
ID	CID	Stage	StartTime	EndTime	Variants
1	1	W	2018-11-21 19:00:00		EN, Prospect

```
SELECT CID, Title
FROM Products+
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```

Content Database

- ★ Organization
- ★ Inheritance
- ★ Authorizations
- ★ Workflow
- ★ Revisions
- ★ Variants

The new WITH clause makes sure we only get English language variants of products for prospective customers.
This query is powerful and much easier to write, which makes building applications around this content easier and faster.
A content database should provide a simplified query language like that, and abstract away the challenges of converting it into the more complex SQL.

Content Database: Considerations

Considerations:
Fallbacks, Optimizations

More information:
webcomand.com/blog/content-databases

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We have only scratched the surface here, there are lots of other considerations here for both context features and performance.
So, I hope you have enjoyed this quick overview of Content Databases.
We have a blog post relating to this, and we will be posting more in the future that dive into exactly how we built these context features on an SQL database.
Our product webCOMAND, which does all of this and a lot more out of the box, makes building web and mobile applications easier and faster.