Android Building Blocks: SQLite, ContentProvider and Loader Oh My!

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Agenda

- Using SQLite for data storage?
- Demonstration
- What is a ContentProvider?
- What is a Loader?
- Source Code
- Questions?

Using SQLite for data storage?

Most SQL database engines (every SQL database engine other than SQLite, as far as we know) uses static, rigid typing. With static typing, the datatype of a value is determined by its container - the particular column in which the value is stored.

SQLite uses a more general dynamic type system. In SQLite, the datatype of a value is associated with the value itself, not with its container.

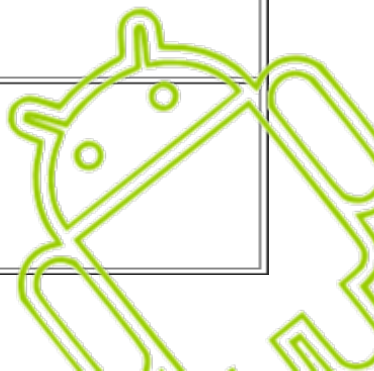
SQLite storage classes?

Each value stored in an SQLite database (or manipulated by the database engine) has one of the following storage classes:

- NULL. The value is a NULL value.
- INTEGER. The value is a signed integer, stored in 1, 2, 3, 4, 6, or 8 bytes depending on the magnitude of the value.
- REAL. The value is a floating point value, stored as an 8-byte IEEE floating point number.
- TEXT. The value is a text string, stored using the database encoding (UTF-8, UTF-16BE or UTF-16LE).
- BLOB. The value is a blob of data, stored exactly as it was input.

SQLite data types and type affinity?

Example Typenames From The CREATE TABLE Statement or CAST Expression	Resulting Affinity	Rule Used To Determine Affinity
INT INTEGER TINYINT SMALLINT MEDIUMINT BIGINT UNSIGNED BIG INT INT2 INT8	INTEGER	1
CHARACTER(20) VARCHAR(255) VARYING CHARACTER(255) NCHAR(55) NATIVE CHARACTER(70) NVARCHAR(100) TEXT CLOB	TEXT	2
BLOB *no datatype specified*	NONE	3
REAL DOUBLE DOUBLE PRECISION FLOAT	REAL	4
NUMERIC DECIMAL(10,5) BOOLEAN DATE DATETIME	NUMERIC	5



Demonstration

- Let's see some Android action!

What is a ContentResolver?

The Content Resolver includes the **CRUD** (create, read, update, delete) methods corresponding to the abstract methods (insert, delete, query, update) in the Content Provider class.

The Content Resolver does not know the implementation of the Content Providers it is interacting with (nor does it need to know); each method is passed an URI that specifies the Content Provider to interact with.

What is a ContentProvider?

Content Providers are one of the primary building blocks of Android applications, providing content to applications. They provides an abstraction from the underlying data source (i.e. a SQLite database).

Content Providers provide mechanisms for defining data security (i.e. by enforcing read/write permissions) and offer a standard interface that connects data in one process with code running in another process.

Using a ContentProvider?

Content Providers provide an interface for publishing and consuming data, based around a simple URI addressing model using the **content: // schema**. They enable you to decouble your application layers from the underlying data layers, making your application data-source agnostic by abstracting the underlying data source.

What is a Loader?

With Android 3.0 came the introduction of the LoaderManager class, an abstract class associated with an Activity or Fragment for managing one or more Loader instances. The LoaderManager *significantly* reduces code complexity and makes your application run a lot smoother. Implementing data loaders with the LoaderManager is simple to implement, and takes care of everything about lifecycle management so are much less error prone.

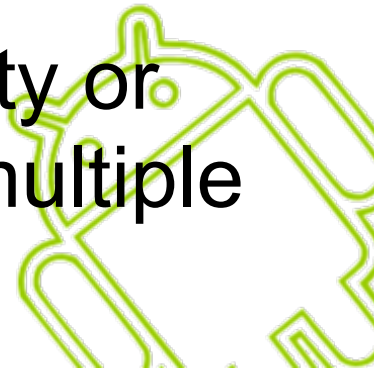
Advantages of Using a LoaderManager?

- They are available to every Activity and Fragment.
- They provide asynchronous loading of data.
- They monitor the source of their data and deliver new results when the content changes.
- They automatically reconnect to the last loader's cursor when being recreated after a configuration change. Thus, they don't need to re-query their data.

Using a LoaderManager?

An abstract class associated with an Activity or Fragment for managing one or more Loader instances. This helps an application manage longer-running operations in conjunction with the Activity or Fragment lifecycle; the most common use of this is with a CursorLoader, however applications are free to write their own loaders for loading other types of data.

There is only one LoaderManager per activity or fragment. But a LoaderManager can have multiple loaders.



Source Code

- Let's see some Android code!

Questions?

References

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- Reaping the Benefits of the LoaderManager Class
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- Android SQLite Database and ContentProvider - Tutorial
- Writing your own ContentProvider
- A Pattern for Creating Custom Android Content Providers
- Better Performance with ContentProviderOperation
- Android's ContentProviderOperation

Information

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Code for this presentation:
github.com/joshpavlovich/SqliteContentProvidersLoaders