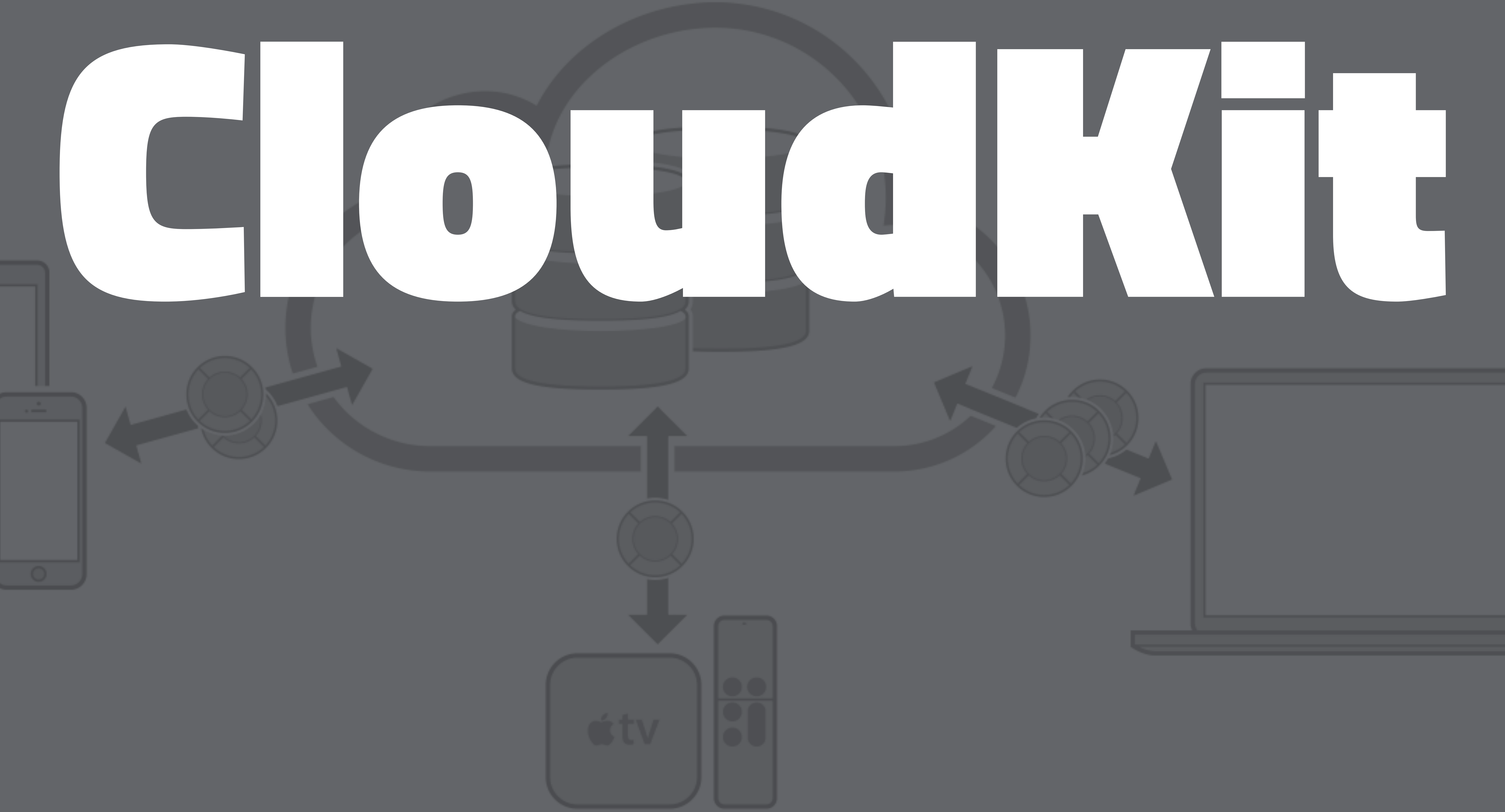
CloudKit



What is CloudKit?

- Apple's backend solution.
- Powers iCloud.
- Some cool apps using it, like Things 3.
- Backend without having to set one up.
- Passes cost on to the user.
- Easy Authentication & Setup.

Parts of CloudKit

CKContainer

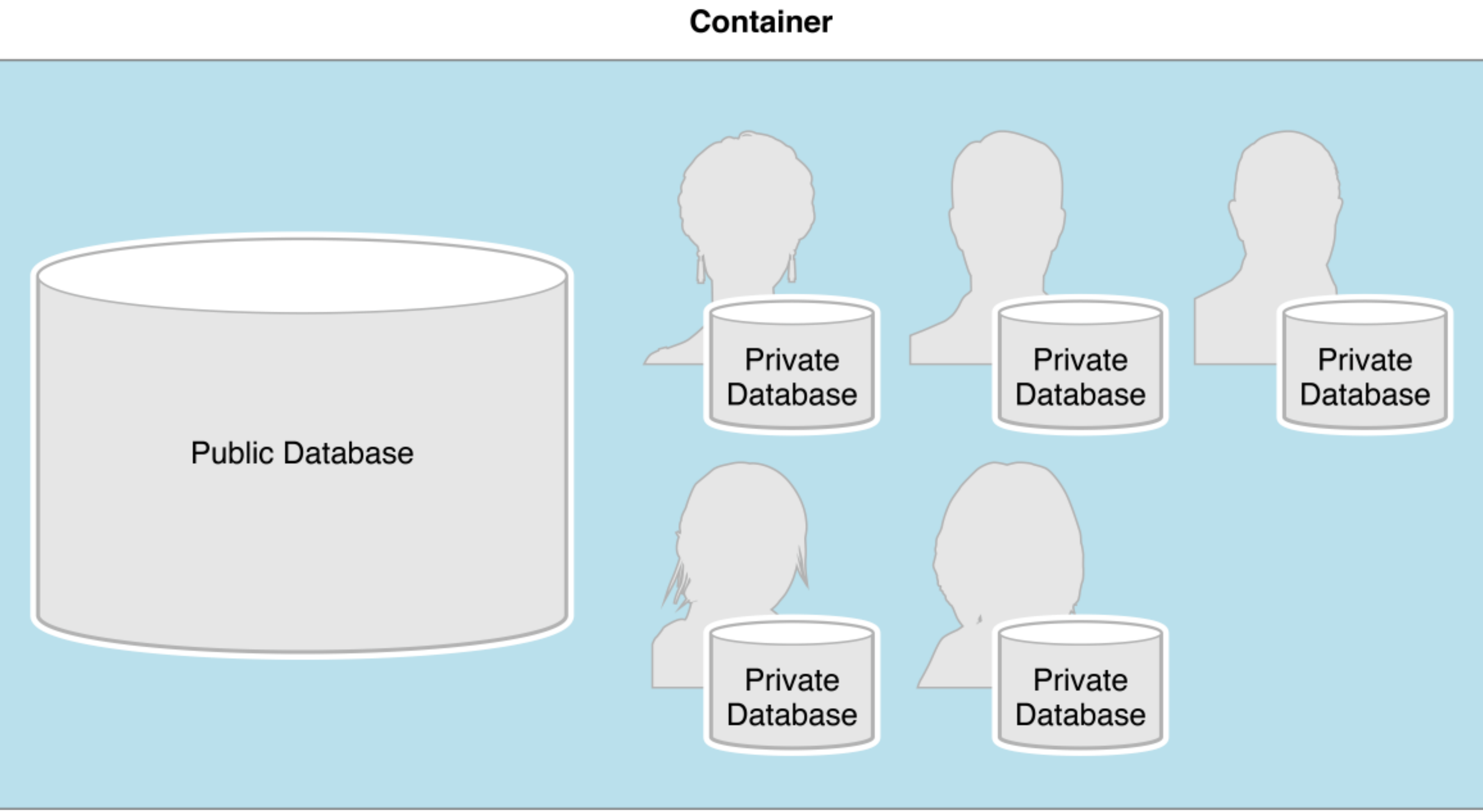
- There is one default CloudKit Container per app.
- The default container's identifier matches that of the app's bundle id.
- Apps can have multiple containers and apps can share containers with other apps by the same developer.

CKDatabase

- CKDatabase objects are children of CKContainer objects.
- Each container holds multiple databases.
- They have a public database accessible to all users. (Readonly for users not signed in to iCloud).
- Your app can also read/write to the user's private database. (Requires active iCloud account).

More...

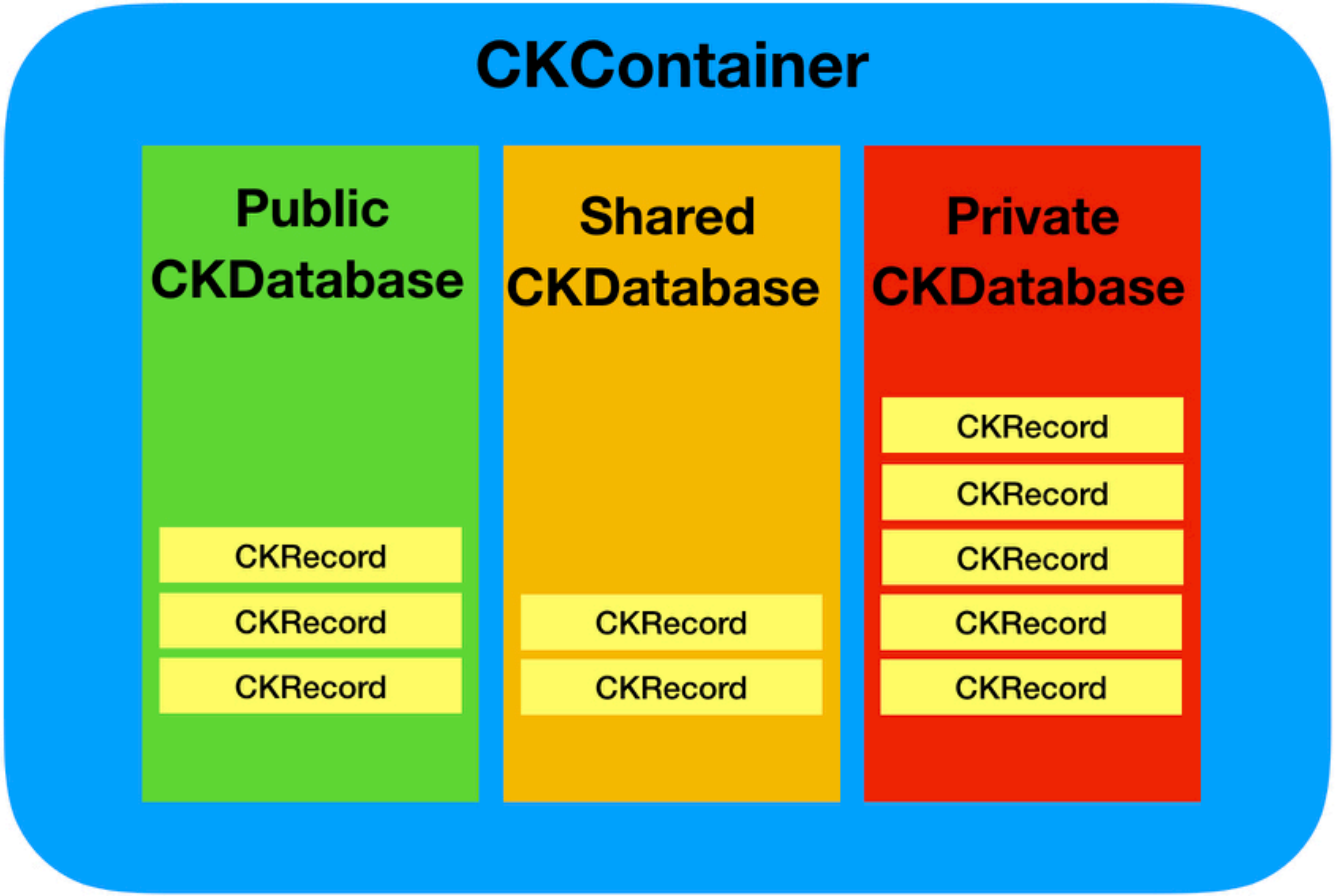
- Private data is not visible to developers in the dashboard.
- New in iOS 10 is the "shared database". (Requires active iCloud account).
- The shared database, like the private database, is not visible in the dashboard to developers.
- Shared data access is controlled by an **`CKShare`** object.
- Users are on the hook for private data storage, which is good for developers. Cost details.


Container
Public Database
Private Database
Private Database
Private Database
Private Database
Private Database

CKRecord

- CKRecords are children of CKDatabase objects.
- Think of them as corresponding to database rows.
- These records are essentially key-value dictionaries.
- Data types are limited to: **`NSString`**, **`NSNumber`**, **`NSData`**, **`NSDate`**, **`NSArray`**, **`CLLocation`**, **`CKAsset`**, **`CKReference`**.
- **`NSData`** should only be used for binary data of a few kilobytes.
- Use **`CKAsset`** for binary files that are larger than a few kilobytes.

- `CKReference` creates a backlink to related record by storing the id of the target object.
- `CKReference` supports cascade deletion.
- 1 to many relationships are supported.
- A single record is limited to 750 references.
- Records require a zone (CKRecordZone).
- If you don't assign a zone then the default zone will be used.
- CKRecordZones are used to further encapsulate data. (Be careful).


CKContainer
Public CKDatabase
CKRecord
CKRecord
CKRecord
Shared CKDatabase
CKRecord
CKRecord
Private CKDatabase
CKRecord
CKRecord
CKRecord
CKRecord
CKRecord

CKQuery

- Used to control you fetch operations.
- Can only be used with a single RecordType.
- You make a CKQuery using **`NSPredicate`**. Full **`Predicate`** construction isn't supported. (Check the documentation).
- Set **`NSPredicate`** with a value of **`true`** to get all records.
- CKQuery also takes an optional **`NSSortDescriptor`** array.

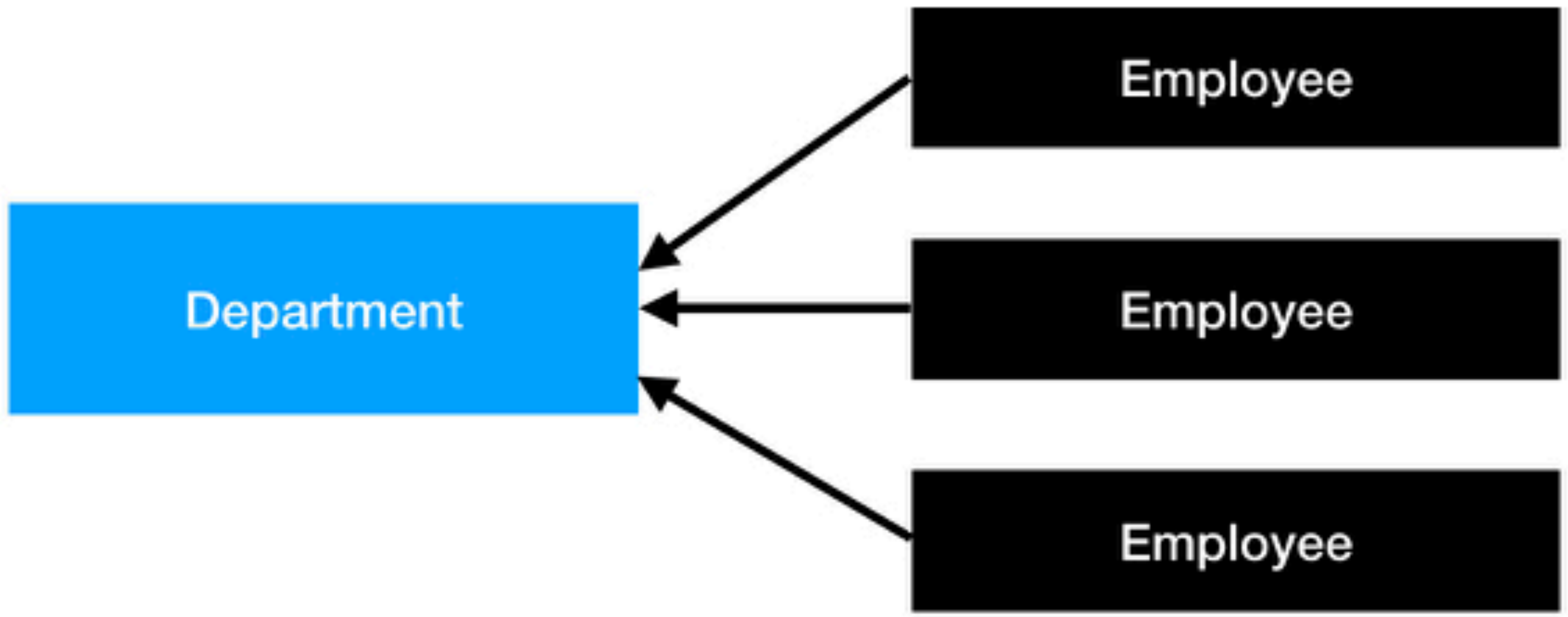
Authentication

- If your user is logged into iCloud they are authenticated!
- If not, they can only read the public db.
- Always check that users are logged into iCloud and warn them of limited functionality if they aren't.
- Call **`accountStatus(completionHandler:)`** on the container to determine whether the user is logged in.
- Your app should sign up to receive **`CKAccountChanged`** notifications.

CKReference

- Used to create a many-to-one relationship between records in a database.
- A reference stores information about the one record that is the target of the reference.
- The reference object is saved in the fields of one or more records to create a link from those records to the target.
- Both records must be located in the same zone.

- For instance, let's say our employee has a department.
- Make a **`CKReference`** out of a **`department`** record.
- **`department`** is the target object.
- We then add this reference (backlink) to any employee objects that are in that department.
- When creating a CKReference we have to specify the "delete policy".
- If the target object is deleted (department in our example) does this remove all employees in that department or not?


Employee
Employee
Employee
Department

Convenience Vs Operations API

- There are 2 API's: Convenience, Operations.
- CloudKit Operations derive from **`(NS)Operation`**.
- Operations let you batch fetches and changes.
- Operations are highly configurable. Eg. (dis)allow cellular, fetch partial records, limit result set, progress reporting, determining priority, etc.

Operations

`CKQueryOperation`

- Used when you have a lot of data.
- **`CKQueryOperation`** is used for performing fetches and allows you to specify a result size, to permit paging, and get progress.
- Since **`CKOperation`** inherits from **`NSOperation`** you may have to look at the **`NSOperation`** class to figure out how to use it.

`CKModifyRecordsOperation`

- An operation that saves changes to one or more record objects.
- Used for add, update, delete operations.
- The **`savePolicy`** determines how you want to handle conflicting data.
- Modify operations can be marked **`isAtomic`** if we want all operations to fail if any single record fails. (**`true`** default)
- Assign a completion block to handle callbacks.

Demo

Push Notifications

- No encryption key setup required.
- Push notifications can be silent or not.
- Silent notifications do not require user authorization. Just call **`registerForRemoteNotifications`** on **`UIApplication`**.
- Push notifications can only be received on a real device.
- Uses UNUserNotification API!

CKSubscription

- You can subscribe to data changes to receive push notifications!
- Only create a CKSubscription once. (You can store this in `UserDefaults`)
- These can run silently and wake the app in the background to update data.
- Typically you will fetch when you're notified about changes.

More...

- To receive push notifications as silent set the **`CKNotificationInfo`** instance to **`shouldSendContentAvailable`** to **`true`**.
- **`CKDatabaseSubscription`** (iOS 10+) only works on private + shared databases and allows you to be notified of changes across the db.
- Make sure to set the **`notificationInfo`** property on the subscription instance.

More...

- Use the **`application(_: didReceiveRemoteNotification: fetchCompletionHandler:)`** to receive your notification callback.
- Inside the completion handler pass the userInfo key to a **`CKNotification(fromRemoteNotificationDictionary:)`** in order to check the **`subscriptionID`**.

Push Demo

References

- CloudKit Starter Documentation
- CloudKit Best Practices WWDC