

Ubiquitous and Mobile Computing

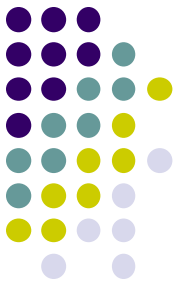
CS 528:Firebase Tech Talk

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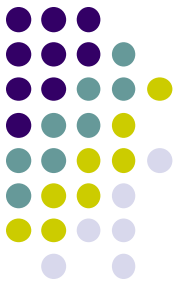


What is Firebase?



- Started off as the Realtime Database
- A mobile SDK for connecting to a json NoSQL database which would update in realtime keeping apps in sync.
- In 2011, before Firebase, it was a startup called Envolv.
- In 2012, Firebase was created as a separate company that provided Backend-as-a-Service with *real-time functionality*.

What is Firebase?



- In 2014, Firebase Inc. was acquired by Google.
- Successful companies/apps/services use Firebase:

The New York Times

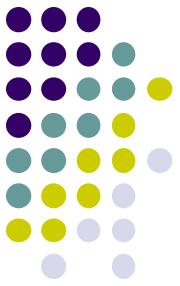


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What is Firebase?



- Firebase now offers many different products such



Cloud
Firestore



Cloud Function
for Firebase



ML Kit
for Firebase



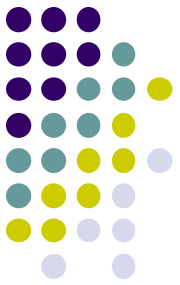
Firebase
Realtime Database



Firebase
Crashlytics

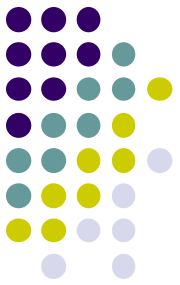


Cloud Storage
for Firebase



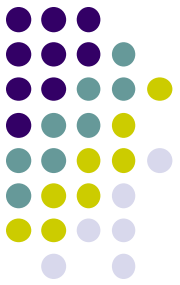
We will discuss...

- Cloud Messaging
- Firestore Database
- Authentication



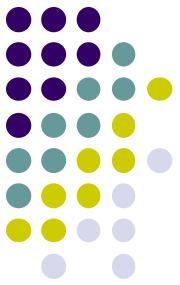
Firestore Cloud Messaging

- Firestore Cloud Messaging is the only way to do efficient push messaging on Smartphones.
- Register a service that will receive messages from Firestore server.
- Messages can contain data and notification payloads.



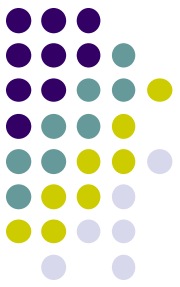
Firestore Cloud Messaging

```
public void onMessageReceived(RemoteMessage remoteMessage) {  
    // Check if message contains a data payload.  
    if (remoteMessage.getData().size() > 0) {  
        handleNow(remoteMessage.getData());  
    }  
  
    // Check if message contains a notification payload.  
    if (remoteMessage.getNotification() != null) {  
        Log.d(TAG, "Message Notification Body: " +  
remoteMessage.getNotification().getBody());  
    }  
}
```



Why Firestore Database

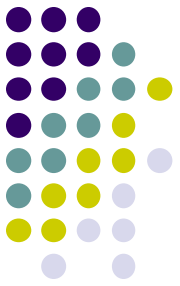
- How do you store data in your applications?
- How do you share data between devices?



Before Firestore Database

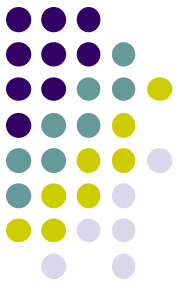
- Provisioning a relational database on your own server, or AWS requires hours of configuration
- You have to write server side code in a different language than your client app
- You have to define a REST API for the client server communication
- Forget about real time data exchange (web sockets)

Firestore Database To The Rescue



- No server side code necessary
- Convenient client side library for language of your choice
- No json parsing required
- Real time update support built in

Firestore Database

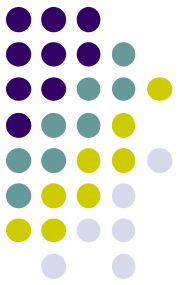


```
FirebaseDatabase database = FirebaseDatabase.getInstance()
// write
database.child("posts").child("postId").setValue(post.id);

// read / listen
database.child("posts").addValueEventListener(new ValueEventListener() {
    @Override
    public void onDataChange(DataSnapshot dataSnapshot) {
        // ...
    }

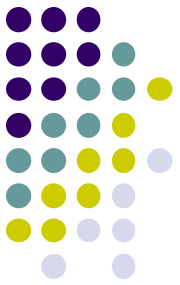
    @Override
    public void onCancelled(DatabaseError databaseError) {}
});
```

Web Console



Home > posts > QaKYRw9cPINu...

food-savers-6415a	posts	QaKYRw9cPINu89bnUgua
+ Add collection	+ Add document	+ Add collection
food	QaKYRw9cPINu89bnUgua >	foodItems
posts >		+ Add field
ratings		address: "100 Institute Rd"
users		claimed: false
		consumer: "users/MzB8GGIQS67hxEYVP6Vu"
		description: "An apple"
		▼ foodItems
		location: [0° N, 0° E]
		pictureURL: "picture-url"
		producer: "users/MzB8GGIQS67hxEYVP6Vu"
		▼ tags



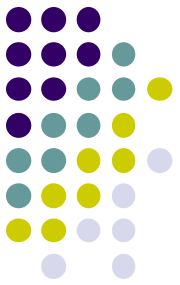
Queries and Limitations

- Simple queries are supported with some caveats
- Equality and ranges, but only one attribute for chained range queries
- No JOIN queries

✓ `citiesRef.whereEqualTo("state", "CO")
 .whereEqualTo("name", "Denver");`

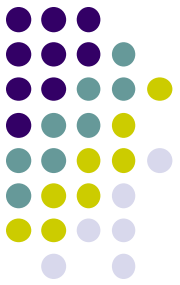
✓ `citiesRef.whereEqualTo("state", "CA")
 .whereGreaterThan("population", 1000000);`

✗ `citiesRef.whereGreaterThanOrEqualTo("state", "CA")
 .whereGreaterThan("population", 100000);`



Firebase Authentication

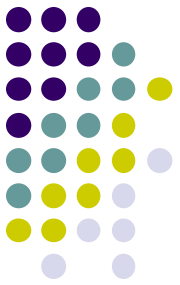
- Managing user data securely is difficult
- Maintaining auth tokens is tedious
- People can't remember more passwords



Firebase Authentication

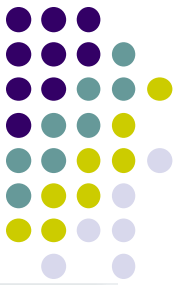
- Firebase works with multiple authentication providers, set up sign in with Facebook, Twitter, Google, Email/Password, or even Anonymous Auth
- Client libraries for implementing sign in UI
- Handles tokens securely syncs data between devices, password reset, and even SMS authentication

Firebase Authentication



```
FirebaseAuth auth = FirebaseAuth.getInstance();

auth.signInWithEmailAndPassword(email, password)
    .addOnCompleteListener(new OnCompleteListener() {
        @Override
        public void onComplete(Task task) {
            if (task.isSuccessful()) {
                FirebaseUser user = task.getResult().getUser();
                String email = user.getEmail();
                // ...
            }
        }
    });
```

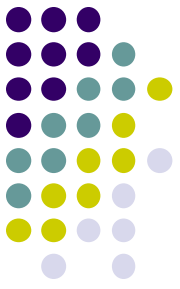



Firebase Authentication Console

Search by email address, phone number, or user UID Add user ↻ ⋮

Identifier	Providers	Created	Signed In	User UID ↑
f████████@gmail.com		Aug 24, 2017	Aug 7, 2018	CUKGiCPmLpQIYQz2tgQ3yEYMIQE3
██████@vouldjeff.com		Feb 10, 2018	Feb 10, 2018	NsXQQ1IGczQCkkAhsxMxDIWokm...
██████tagpenny@gmail.com		Dec 26, 2017	Dec 26, 2017	WOG6wRSavzOUGvk6Jsl nabPk3ru1
██████jen@enhancv.com		Sep 16, 2017	Feb 27, 2018	XhMzGpaFd6PPEXFDnjgN9J6Jz623
██████quarynola███@gmail.com		Jan 9, 2018	Jan 9, 2018	e7OfLdwzmTNO4jPp8Yh0niQcRdL2
██████ngobri█@gmail.com		May 9, 2018	May 9, 2018	fe6kNfBSXPbOcyznGj5MALNkXHb2
██████ng2npr█@gmail.com		Feb 27, 2018	Feb 27, 2018	nFRalpDCqjWNa0QaiTAKHieqjoj2
██████at█████@gmail.com		May 9, 2018	May 9, 2018	s6G03NQGjuPJGCEOBNMhoj0XdFl1
██████egandev@gmail.com		Nov 17, 2017	Dec 24, 2017	wGaEh98uvxSJTKJ0FoM4Z1GajG...

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Next Steps

- Getting started with Firebase Codelab
- Covers all the topics we discussed in more detail including a few extra topics
- Cloud Functions allow you to write server side code that responds to update triggers
- If you're interested in ML checkout the new Firebase ML Kit documentation
- Other products include Analytics, AdMob, Cloud Storage