

(DDA) 2.2

DEVELOPING DYNAMIC APPLICATIONS

2021



DDA

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COVERAGE

Week 8

Learning Objectives

1. Recap Firebase Web & Setup
2. Dashboarding 101
3. CRUD in action
4. Dashboarding with Web Templates & Charts

*Note: We are **using Firebase v9**.*

We are NOT using Firebase v8

Do not use Firestore unless you are familiar with it. Because your Unity will need to use it too.

USE AS YOU WILL

You can download dashboard templates in our DDA MS Teams channel > Files

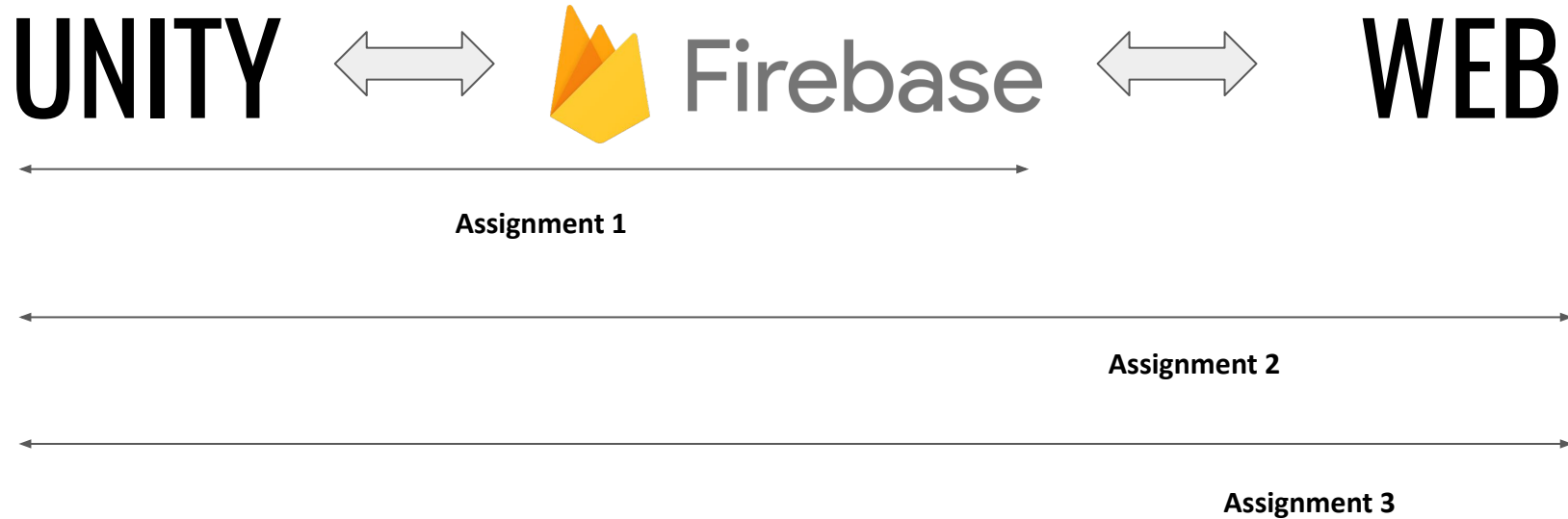


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Firestore Web

#Recap

Recap Firebase



How to Setup your Firebase & Web + Forms

1. Start with the Firebase config settings and place into a **"config.js"** JS script that can be found in your Firebase console -> project settings (Web)
2. **Initialize your app** based on the **firebase config**
3. Create another **"main.js"** JS file that contains your **necessary Firebase imports**
4. Create your UI using HTML
5. Add on logic to your **"main.js"** to **retrieve the auth object or database object from Firebase**
6. Add Event Listeners that listen to your form
Remember: to place in necessary error handlers

/project
--/js
|-- config.js
|-- main.js
signup.html

Simple Sign Up

Email Address
Enter email

Password
Enter password

☐ Remember Me

Login Sign Up

Forgot Password

Please sign up or login into the system

```
const firebaseConfig = {  
  apiKey: "",  
  authDomain: "",  
  databaseURL: "",  
  projectId: "",  
  storageBucket: "",  
  messagingSenderId: "",  
  appId: "",  
  measurementId: "",  
};
```

```
//[STEP 1] Base firebase imports  
import { initializeApp } from "https://www.gstatic.com/firebasejs/9.5.0/firebase-app.js";  
  
import {getDatabase, ref, child, get, set, onValue, orderByChild, orderByVal, query, equalTo, startAt, startAfter, endAt, endBefore, limitToFirst, limitToLast} from "https://www.gstatic.com/firebasejs/9.5.0/firebase-database.js";  
  
import {getAuth, createUserWithEmailAndPassword, signInOut, onAuthStateChanged, updateProfile, updateEmail, updatePassword, signInWithEmailAndPassword} from "https://www.gstatic.com/firebasejs/9.5.0/firebase-auth.js";  
  
//[STEP 2] Setup our base global references to the services  
//=====
```

You must initialize the app, db

```
//Must initialize Firebase app w/ config to start  
const app = initializeApp(firebaseConfig);  
const db = getDatabase(); //db reference  
const auth = getAuth(); //auth service reference
```

```
let btnSignup = document.getElementById("btn-signup"); //signup btn  
btnSignup.addEventListener("click", function (e) {  
  e.preventDefault();  
  let email = document.getElementById("email").value;  
  let password = document.getElementById("password").value;  
  
  //let email = $("#email").val();  
  //let password = $("#password").val();  
  console.log(`Sign-ing up user with ${email} and password ${password}`);  
  //[STEP 4: Signup our user]  
  signUpUserWithEmailAndPassword(email, password);  
});
```



What do I need to Import?

V9 of Firebase loads via a modular format. Hence we only load the functions that we need.

It is important to declare the script as a **module type** when we are including it in the HTML

```
<script src="../lib/snippets/crud-player.js"
type="module"></script>
```

```
import {
  getDatabase,
  ref,
  child,
  get,
  set,
  onValue,
  orderByChild,
  orderByValue,
  query,
  equalTo,
  startAt,
  startAfter,
  endAt,
  endBefore,
  limitToFirst,
  limitToLast,
} from
"https://www.gstatic.com/firebasejs/9.5.0/firebase-da
tabase.js";
```

What you are importing depends on your needs of the service.

A full list of documentation can be found below

Database:

https://firebase.google.com/docs/reference/js/database.md#database_package

Authentication:

<https://firebase.google.com/docs/reference/js/auth>



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Creating Dynamic Keys

```
import { getDatabase, ref, push, set } from
"firebase/database";

// Create a new post reference with an auto-generated
id
const db = getDatabase();
const postListRef = ref(db, 'posts');
const newPostRef = push(postListRef);
set(newPostRef, {
  // ...
});
```

To create a randomly generated key which is unique, we can tap onto the `push()` function.

It works the same way as the C# variant, what we need to have is a reference path ①

Then we have our **push**. This “Push to my reference” depends on where the reference path is. Once the path is allocation, the key will be generated inside as a new node using push. ②

WHY do we need such?

When data is spontaneous

Not so concerned about key values

[https://firebase.google.com/docs/database/web/lists-of-data#append_t
o_a_list_of_data](https://firebase.google.com/docs/database/web/lists-of-data#append_t_o_a_list_of_data)



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What is an Index (Optimisation)

An index is a powerful tool. Say for example, our NRICs are unique and we know that it is unique. So it is treated like a key in our database. So once we know exactly the key we can retrieve the data

In databases, an index works by “compiling” that data nicely. So that we can sort our data efficiently.

In Firebase terms we use

**.OrderByChild(“somechildproperty”) or
.OrderByKey(“somekey”)**

When we index, the database will query and find the data much more efficiently. However, having said so, firebase is pretty efficient. So it depends on how much data you have, and how you want to manipulate the data.

```
{  
  "rules": {  
    ".read": true, // 2021-11-11  
    ".write": true, // "now < 1636560000000", // 2021-11-11  
    "playerStats": {  
      ".indexOn": ["highScore"]  
    },  
    "leaderboards": {  
      ".indexOn": ["highScore"]  
    }  
  }  
}
```

Using OrderByChild hence we index the child properties

Additional Reading

<https://firebase.google.com/docs/database/security/indexing-data>



Sorting Data (READING)

Method	Usage
<code>orderByChild()</code>	Order results by the value of a specified child key or nested child path.
<code>orderByKey()</code>	Order results by child keys.
<code>orderByValue()</code>	Order results by child values.

*You can only use **ONE** order-by method at a time.
Calling an order-by method multiple times in the same query throws an error.*

To retrieve sorted data, start by specifying one of the order-by methods to determine how results are ordered:

```
const latestPlayerRef = query(
  ref(db, "players/"),
  orderByChild("createdOn"),
  limitToLast(1)
);
let result = await get(query(latestPlayerRef));
```

Encountering similar errors?

Uncaught (in promise) Error: Index not defined, add ".indexOn": "level", for path "/playerStats", to the rules at Repo.ts:482

When you are using **orderByChild**, do ensure you have placed the **appropriate indexes** in your Firebase Database rules

```
1 {
2   "rules": {
3     ".read": true, // 2021-11-11
4     ".write": true, // "now < 1636560000000" // 2021-11-11
5     "players": {
6       ".indexOn": ["createdOn"]
7     },
8     "playerStats": {
9       ".indexOn": ["highScore", "level"]
10    },
11    "leaderboards": {
12      ".indexOn": ["highScore"]
13    }
14  }
15 }
```

[c/lists-](#)
[t_data](#)



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Filtering Data (READING)

Method	Usage
limitToFirst()	Sets the maximum number of items to return from the beginning of the ordered list of results.
limitToLast()	Sets the maximum number of items to return from the end of the ordered list of results.
startAt()	Return items greater than or equal to the specified key or value, depending on the order-by method chosen.
startAfter()	Return items greater than the specified key or value depending on the order-by method chosen.
endAt()	Return items less than or equal to the specified key or value, depending on the order-by method chosen.
endBefore()	Return items less than the specified key or value depending on the order-by method chosen.
equalTo()	Return items equal to the specified key or value, depending on the order-by method chosen.

Unlike the order-by methods, you can combine multiple limit or range functions. For example, you can combine the startAt() and endAt() methods to limit the results to a specified range of values.

Getting the latest player entry

```
const latestPlayerRef = query(
  ref(db, "players/"),
  orderByChild("createdOn"),
  limitToLast(1)
);
let result = await
get(query(latestPlayerRef));
```



Filtering Data (Getting a Range using startAt endAt)

Method	Usage
startAt()	Return items greater than or equal to the specified key or value, depending on the order-by method chosen.
startAfter()	Return items greater than the specified key or value depending on the order-by method chosen.
endAt()	Return items less than or equal to the specified key or value, depending on the order-by method chosen.
endBefore()	Return items less than the specified key or value depending on the order-by method chosen.



Working with Imports

Imports used in Firebase are meant to keep things as modular as possible. In order to load faster, and bring about better efficiency

```
import {
  getAuth,
  setPersistence,
  signInWithEmailAndPassword,
  browserSessionPersistence,
  inMemoryPersistence,
  browserLocalPersistence, //default
} from
"https://www.gstatic.com/firebasejs/9.5.0/firebase-auth.js";
```

```
import {
  getDatabase,
  ref,
  child,
  get,
  set,
  onValue,
  orderByChild,
} from
"https://www.gstatic.com/firebasejs/9.5.0/firebase-database.js";
```

```
//base firebase config
import { initializeApp } from
"https://www.gstatic.com/firebasejs/9.5.0/firebase-app.js";

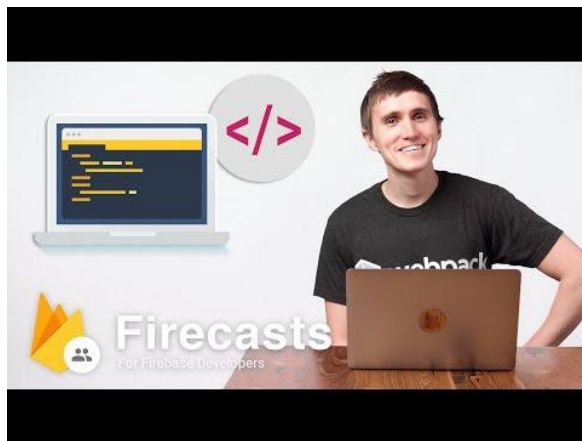
//config settings derived from firebase console
const firebaseConfig = {
  apiKey: "A ",
  authDomain: " ",
  databaseURL: " ",
  projectId: " ",
  storageBucket: " ",
  messagingSenderId: " ",
  appId: " ",
  measurementId: " "
};

//Must initialize Firebase app w/ config to start
const app = initializeApp(firebaseConfig);
```

Lost? Watch this

How to import Firebase with JavaScript modules - Firecasts

<https://www.youtube.com/watch?v=IGqKYpvLkhE>



Additional Reading

[e.com/docs/database/security/indexing-data](https://firebase.google.com/docs/database/security/indexing-data)



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Dashboarding

#Games

What kind of Data????

What kind of data/information can we store for a game administrator dashboard?
Grab a sticky, and start filling in your thoughts

No. Of new users

-> comparing against last wk? Yesterday?

Total Time Played

-> tally of session logs

Shots fired

-> for each shot -> save to db

Headshot percentage

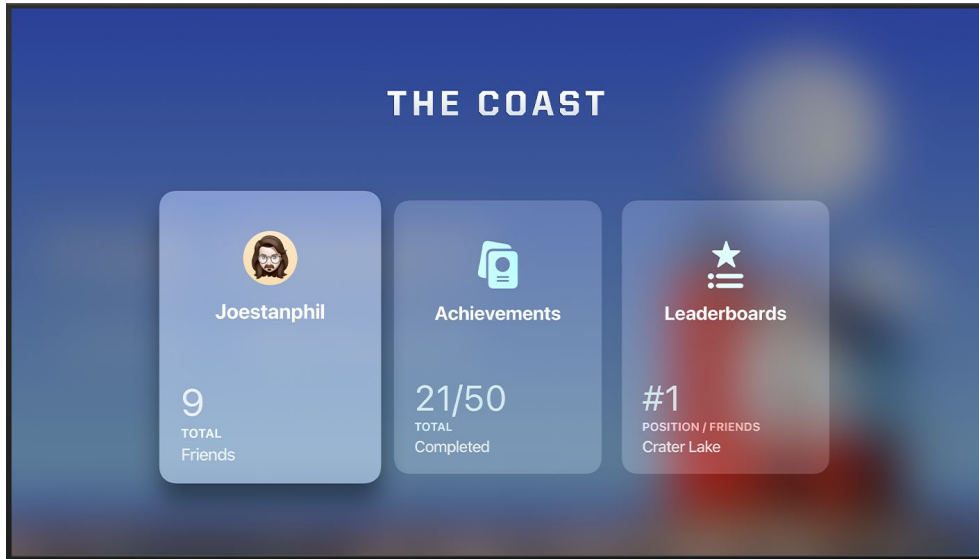
Num headshots/ Number of shots

average clear time	No. of new users	Last item equipped	Total Damage dealt of a specific class			
games played	Win rate	no. of unique items owned	K/D ratio	Total time played		
deaths	Gun accuracy	item name	experience points	crafting level	durability	
no. of kills	premium user? lol	Score accumulation	amount of damage done	lose rate	max item stack	Frequency of visit
number of times banned	User chat history (very sus)	in game currency	amount of headshots	shiny pokemons caught	Champion Mastery (LOL)	Item storage
Time taken	headshot percentage	Distance traveled	Number of users online	Key Items Obtained	EXP	shots fired



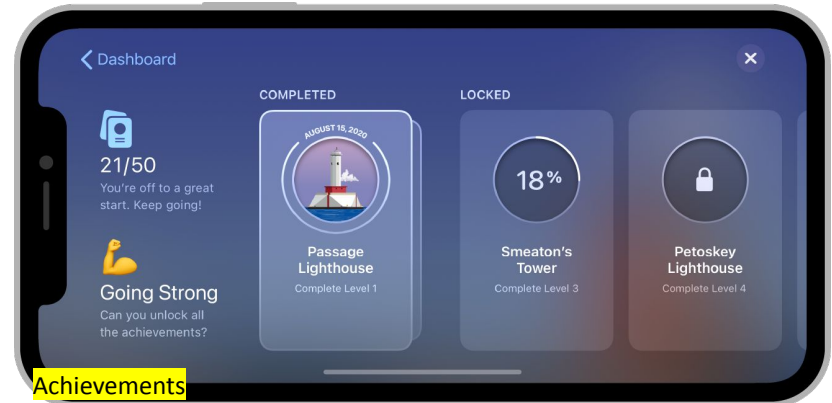
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Dashboarding 101

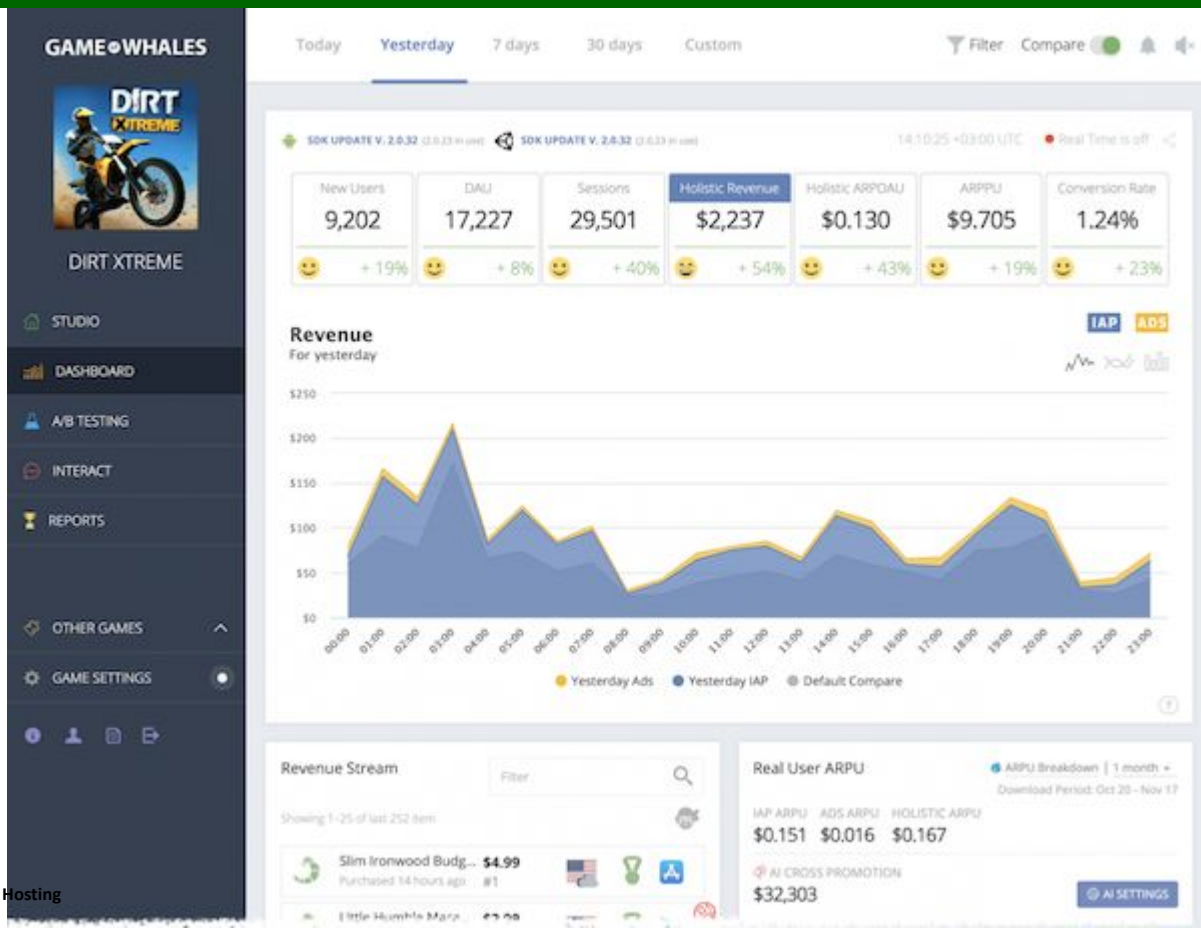


Apple Game Center

<https://developer.apple.com/design/human-interface-guidelines/game-center/overview/introduction/>



Dashboarding 101



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Dashboarding 101

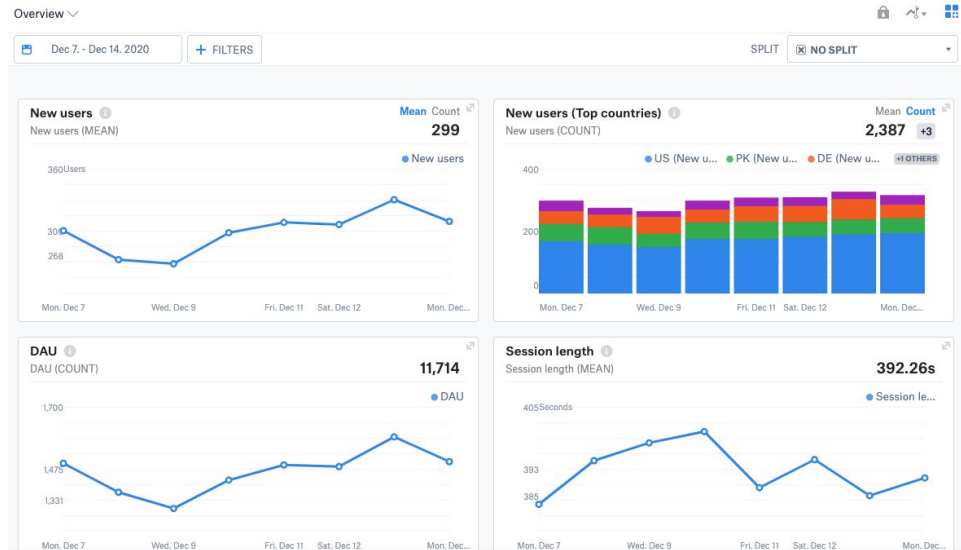
Thoughts: Behavior vs Performance?

Metrics are at the basis of solid decision making. When you focus on what your users want to accomplish with these metrics it opens up the design space, allowing for creative problem solving and a goal-oriented development process.

For Whom?

- Customers (Managers, etc)
 - Track habits
 - \$\$
- Development Team
 - Track errors, hacks
 - Track player interactions
 - Data driven game design (identify game optimisation)
- Players
 - For extensive insights into their game

- Daily Active Users/Monthly Active Users
- Day 1/7/30 Retention
- First Time Users Experience (FTUE)
 - What was one on-boarding experience you like



Dashboarding 101 (Session Time metric)

Average Session Time metric can be used to gauge the bounce rate along with the number of times the same player keeps coming returning to the game each day.

What makes a good session time?

You have to determine what makes a session.

eg.

User click on Start?

User spend X amount of time?

User trigger some events ?

Your definition of an action that turns a user into an 'active user' depends on your business model and goals.



Average session length - an average time spent in the app per user. Defined as the sum of the length of all sessions divided by the number of sessions within a given period.

<https://www.blog.udonis.co/mobile-marketing/mobile-games/session-length>



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Dashboarding 101 (Session Time metric)

DAU (Daily Active Users) – the number of unique users per day;

WAU (Weekly Active Users) – the number of unique users per week;

MAU (Monthly Active Users) – the number of unique users per month.

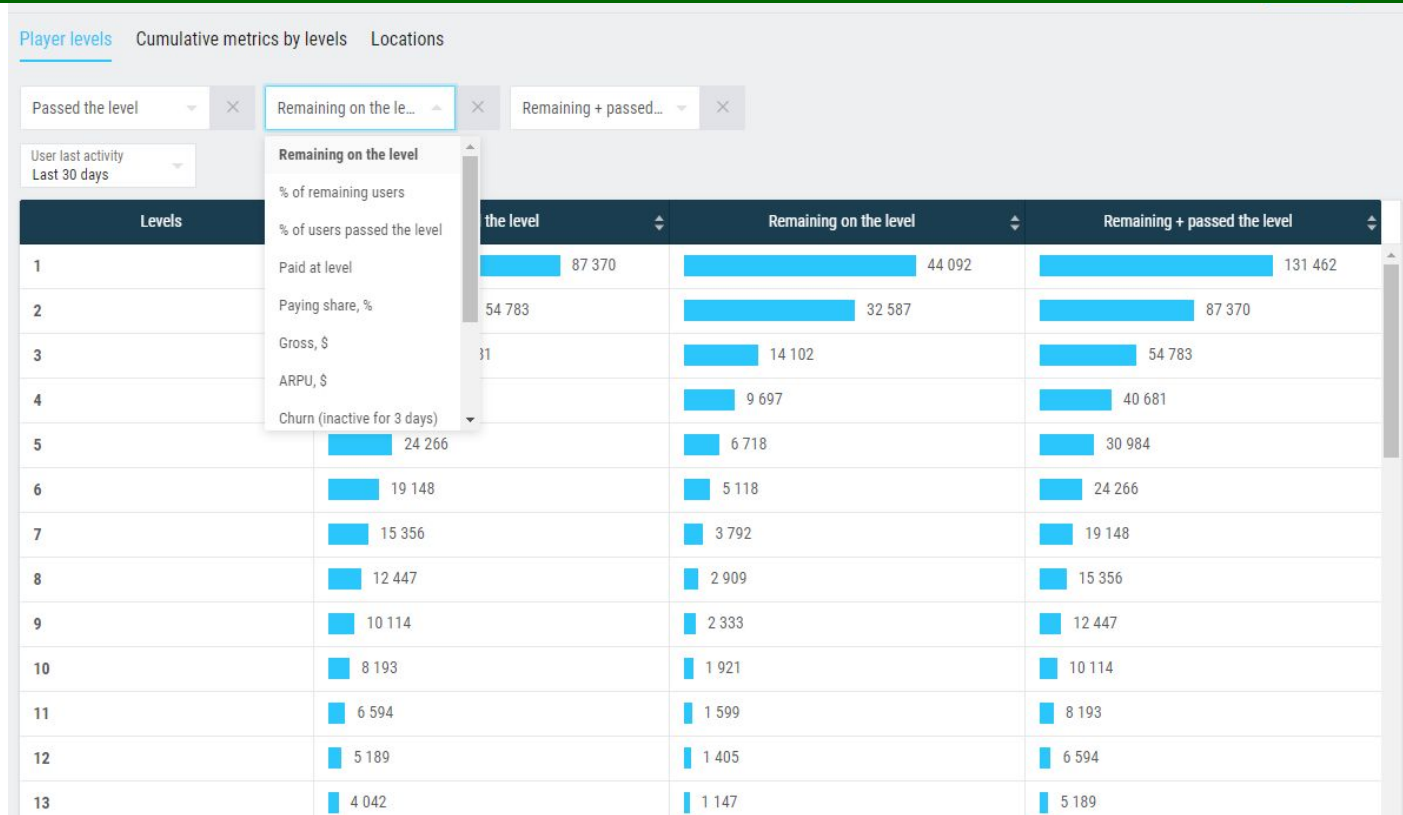
Session length is a metric that shows the amount of time a user spends playing a mobile game. It is also one of the most important mobile game KPIs in terms of user experience and engagement.

A session starts at the moment when a user opens an app and lasts until the user closes it or stops actively using it. In other words, it measures the duration of a single continuous app experience, or in this case, **gameplay experience**. When the game gets sent to the background, this typically marks the end of a session.

If you want to **calculate session length**, there is a simple formula. Just subtract the time when the user became inactive from the time the app was opened.



Dashboarding 101 (Level Completion metric)



Dashboarding 101: Player Behavior

Onboarding — are players making it through your onboarding mechanics such as tutorials or starting levels?

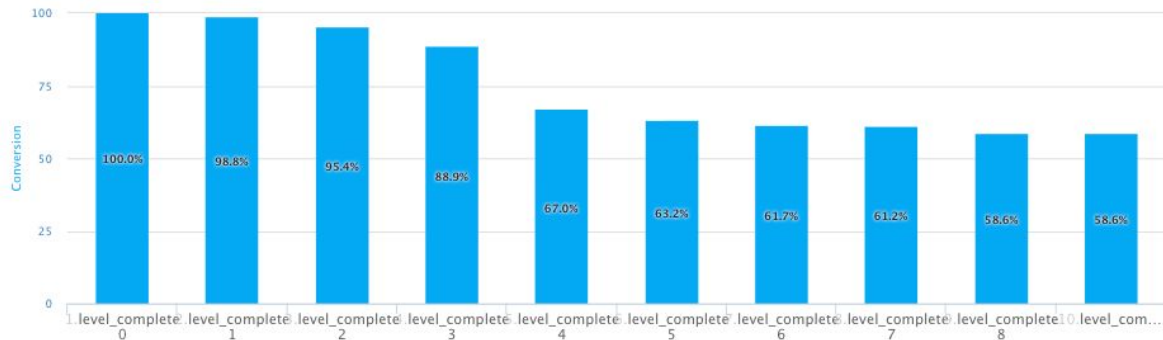
Progression — are players progressing through your levels?

Economy — are your game economies working out as expected?

Design validation — are your game design choices working out as you thought they would?

Application validation — are all areas of your application being utilized as you expect? Are there parts that players ignore or don't notice?

Monetization — are your monetization strategies optimal? Are there impediments to players carrying out purchases?



Tutorial conversion - the share of new users who have successfully completed the tutorial.

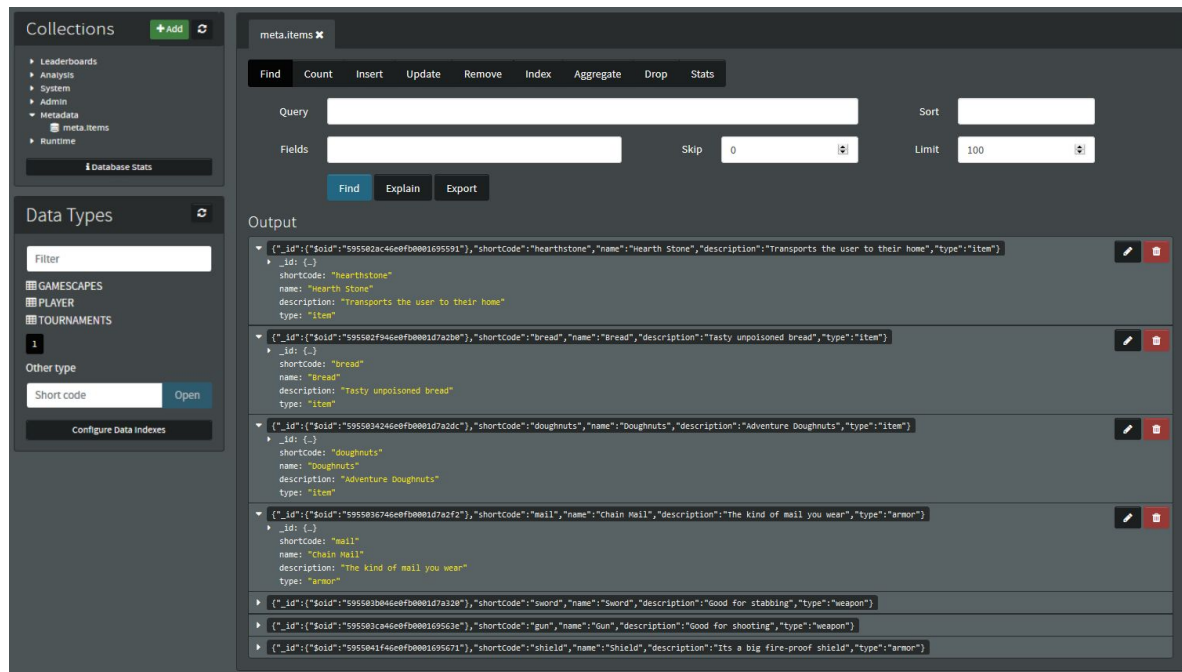


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Dashboarding 101: Items

You might have items in game and to store them in the database for more efficiency.

This will allow some additional dynamics to the game flow



The screenshot shows the Unity Analytics dashboard interface. On the left, there's a sidebar with 'Collections' and 'Data Types' sections. The 'Collections' section lists various data sources like Leaderboards, Analysis, System, Admin, Metadata, meta.items, and Runtime. The 'Data Types' section has a filter input and a list of data types: GAMESCAPES, PLAYER, TOURNAMENTS, and Other type. The 'Other type' section has a 'Short code' input and an 'Open' button. The main area displays the 'meta.items' collection. It has a top bar with tabs for Find, Count, Insert, Update, Remove, Index, Aggregate, Drop, and Stats. Below this is a query input field, a 'Sort' dropdown, and a 'Limit' input field. The 'Find' button is highlighted. The 'Output' section shows a list of items with their metadata. Each item is represented by a JSON object with fields like id, shortCode, name, description, and type. The items listed are: 'hearthstone', 'bread', 'doughnuts', 'mail', 'sword', 'gun', and 'shield'.

```
{
  "_id": {"$oid": "5955034246e0fb0001695591"},
  "shortCode": "hearthstone",
  "name": "hearth Stone",
  "description": "Transports the user to their home",
  "type": "item"
},
{
  "_id": {"$oid": "595502f946e0fb0001d7a2b0"},
  "shortCode": "bread",
  "name": "Bread",
  "description": "Tasty unpoisoned bread",
  "type": "item"
},
{
  "_id": {"$oid": "5955034246e0fb0001d7a2dc"},
  "shortCode": "doughnuts",
  "name": "Doughnuts",
  "description": "Adventure Doughnuts",
  "type": "item"
},
{
  "_id": {"$oid": "5955036746e0fb0001d7a2f2"},
  "shortCode": "mail",
  "name": "Chain Mail",
  "description": "The kind of mail you wear",
  "type": "armor"
},
{
  "_id": {"$oid": "595503b046e0fb0001d7a320"},
  "shortCode": "sword",
  "name": "Sword",
  "description": "Good for stabbing",
  "type": "weapon"
},
{
  "_id": {"$oid": "595503c046e0fb000169563e"},
  "shortCode": "gun",
  "name": "Gun",
  "description": "Good for shooting",
  "type": "weapon"
},
{
  "_id": {"$oid": "5955041f46e0fb0001695671"},
  "shortCode": "shield",
  "name": "Shield",
  "description": "Its a big fire-proof shield",
  "type": "armor"
}
```



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Working with `#Auth.CurrentUser`



Auth.CurrentUser

The Authentication in Firebase is very powerful and packed with features.

Once we are logged in, we can use our authentication reference to retrieve the current user session and get user's details (userId, DisplayName, ProfilePic, etc)

```
const auth = getAuth();  
//Auth refers to our auth object that is derived from the Firebase auth  
service  
//onAuthStateChanged is an observer that provides a Promise return  
//currentUser is our Promise (the naming doesn't matter)  
onAuthStateChanged(auth, (currentUser) => {  
  if (currentUser) {  
    // User is signed in, see docs for a list of available properties  
    // https://firebase.google.com/docs/reference/js/firebase.User  
    const uid = currentUser.uid;  
    statusMsg.innerHTML = `(OnAuthStateChanged) Welcome back:  
    ${currentUser.email} :: ${currentUser.uid}`;  
    console.log`(OnAuthStateChanged) Current user is logged in:  
    ${currentUser.email} ::  
  
  } else {  
    statusMsg.innerHTML = `Please sign up or login into the system`;  
  
  }  
});
```

Reading Reference <https://firebase.google.com/docs/reference/js/firebase.User>

Additional Reading

<https://firebase.google.com/docs/database/security/indexing-data>



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Firestore Hosting

#Firehosting

Firebase Hosting - Capabilities

Serve content over a secure connection

The modern web is secure. Zero-configuration SSL is built into Firebase Hosting, so content is always delivered securely.

Host static and dynamic content plus microservices

Firebase Hosting supports all kinds of content for hosting, from your CSS and HTML files to your Express.js microservices or APIs.

Deliver content fast

Each file that you upload is cached on SSDs at CDN edges around the world and served as gzip or Brotli. We auto-select the best compression method for your content. No matter where your users are, the content is delivered fast.

Emulate and even share your changes before going live

View and test your changes on a locally hosted URL and interact with an emulated backend. Share your changes with teammates using temporary preview URLs. Hosting also provides a [GitHub integration](#) for easy iterations of your previewed content.

Deploy new versions with one command

Using the Firebase CLI, you can get your app up and running in seconds. Command line tools make it easy to add deployment targets into your build process. And if you need to undo the deploy, Hosting provides one-click rollbacks.



Firebase Hosting (Step 1)

<https://firebase.google.com/docs/hosting/quickstart>

The image shows a composite of three screenshots from the Firebase ecosystem. On the left is the 'Project Overview' sidebar with a menu where 'Hosting' is highlighted with a green circle and the number '1'. The middle screenshot is the 'Hosting' quickstart page, which says 'Deploy web and mobile apps in seconds using a secure global content delivery network' and has a 'Get started' button with a green circle and the number '2'. Below this is a section for 'node.js' with two download buttons: '16.13.1 LTS Recommended For Most Users' and '17.2.0 Current Latest Features', with a green circle and the number '3' next to the 'node.js' logo. On the right is a 'Set up Firebase Hosting' dialog box with four steps. Step 1 is 'Install Firebase CLI'. Step 3 is 'Run the following npm command to install the CLI or update to the latest CLI version.' with the command `$ npm install -g firebase-tools` and a green circle with the number '3'. Step 4 is 'Next' with a green circle and the number '4'. Below this is a 'Woohoo! Firebase CLI Login Successful' message with a green circle and the number '5', stating 'You are logged in to the Firebase Command-Line interface. You can immediately close this window and continue using the CLI.'

Project Overview

Build

- Authentication
- Firestore Database
- Realtime Database
- Storage
- Hosting ¹
- Functions
- Machine Learning

Hosting

Deploy web and mobile apps in seconds using a secure global content delivery network

² Get started

node.js ³

HOME | ABOUT | DOWNLOADS | DOCS | GET INVOLVED | SECURITY | CERTIFICATION | NEWS

Node.js® is a JavaScript runtime built on Chrome's V8 JavaScript engine.

Download for macOS (x64)

16.13.1 LTS Recommended For Most Users	17.2.0 Current Latest Features
---	-----------------------------------

Other Downloads | Changelog | API Docs Other Downloads | Changelog | API Docs

Or have a look at the Long Term Support (LTS) schedule

Set up Firebase Hosting

- 1 Install Firebase CLI
- To host your site with Firebase Hosting, you need the Firebase CLI (a command line tool).
- ³ Run the following [npm](#) command to install the CLI or update to the latest CLI version.

```
$ npm install -g firebase-tools
```


Doesn't work? Take a look at the [Firebase CLI reference](#) or change your [npm permissions](#)
- ⁴ Next

⁵ **Woohoo!**

Firebase CLI Login Successful

You are logged in to the Firebase Command-Line interface. You can immediately close this window and continue using the CLI.



Firebase Hosting (Step 2)

<https://firebase.google.com/docs/hosting/quickstart>

```
#####  ##  #####  #####  #####  #####  #####  #####
##  ##  ##  ##  ##  ##  ##  ##  ##  ##  ##  ##  ##  ##
##  #####  #####  #####  #####  #####  #####  #####
```

You're about to initialize a Firebase project in this directory:

`/Users/champ/Documents/DDA/DDA-Github-Desktop/IMYear2.2/Modules/DDA/firebase-web`

6

? Which Firebase features do you want to set up for this directory? Press Space to select features, then Enter to confirm your choices.

ace> to select, <a> to toggle all, <i> to invert selection)

yO Realtime Database: Configure a security rules file for Realtime Database and (optionally) provision default instance

- o Firestore: Configure security rules and indexes files for Firestore
- o Functions: Configure a Cloud Functions directory and its files
- o Hosting: Configure files for Firebase Hosting and (optionally) set up GitHub Action deploys
- o Hosting: Set up GitHub Action deploys
- o Storage: Configure a security rules file for Cloud Storage
- o Emulators: Set up local emulators for Firebase products

(Move up and down to reveal more choices)

Project Setup

First, let's associate this project directory with a Firebase project.
You can create multiple project aliases by running **firebase use --add**,
but for now we'll just set up a default project.

? Please select an option: Use an existing project

? Select a default Firebase project for this directory: malcolm-firebase-playground (Malcolm Firebase Playground)

i Using project malcolm-firebase-playground (Malcolm Firebase Playground)

Database Setup

i database: ensuring required API firebase.database.googleapis.com is enabled...

✓ database: required API firebase.database.googleapis.com is enabled

Firebase Realtime Database Security Rules allow you to define how your data should be structured and when your data can be read from and written to.

? What file should be used for Realtime Database Security Rules? (database.rules.json)

```
#####  ##  #####  #####  ##  #####  #####  #####
##  ##  ##  ##  ##  ##  ##  ##  ##  ##  ##  ##  ##
#####  ##  #####  #####  #####  #####  #####  #####
##  ##  ##  ##  ##  ##  ##  ##  ##  ##  ##  ##  ##
##  #####  #####  #####  ##  #####  #####  #####
```

You're about to initialize a Firebase project in this directory:

`/Users/champ/Documents/DDA/DDA-Github-Desktop/IMYear2.2/Modules/DDA/firebase-web`

? Which Firebase features do you want to set up for this directory? Press Space to select features, then Enter to confirm your choices.

- o Hosting: Configure files for Firebase Hosting and (optionally) set up GitHub Action deploys
- o Hosting: Set up GitHub Action deploys
- o Storage: Configure a security rules file for Cloud Storage

yO Emulators: Set up local emulators for Firebase products

o Remote Config: Configure a template file for Remote Config

- o Realtime Database: Configure a security rules file for Realtime Database and (optionally) provision default instance
- o Firestore: Configure security rules and indexes files for Firestore

(Move up and down to reveal more choices)



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Firebase Hosting (Step 3 - Initialization)

firebase deploy.

<https://firebase.google.com/docs/hosting/quickstart>

=== Hosting Setup

Your **public** directory is the folder (relative to your project directory) that will contain Hosting assets to be uploaded with **firebase deploy**. If you have a build process for your assets, use your build's output directory.

```
? What do you want to use as your public directory? public
? Configure as a single-page app (rewrite all urls to /index.html)? (y/N) n
```

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structured and when your data can be read from and written to.

```
? What file should be used for Realtime Database Security Rules? database.rules.json
✓ Database Rules for malcolm-firebase-playground-default-rtdb have been written to database.rules.json.
Future modifications to database.rules.json will update Realtime Database Security Rules when you run
firebase deploy.
```

=== Hosting Setup

Your **public** directory is the folder (relative to your project directory) that will contain Hosting assets to be uploaded with **firebase deploy**. If you have a build process for your assets, use your build's output directory.

```
? What do you want to use as your public directory? public
? Configure as a single-page app (rewrite all urls to /index.html)? No
? Set up automatic builds and deploys with GitHub? No
✓ Wrote public/404.html
✓ Wrote public/index.html
```

```
i Writing configuration info to firebase.json...
i Writing project information to .firebaserc...
i Writing gitignore file to .gitignore...
```

```
✓ Firebase initialization complete!
champ@ictadmins-MBP firebase-web %
```

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firebase deploy --only hosting

```
champ@ictadmins-MBP firebase-web % firebase deploy
```

=== Deploying to 'malcolm-firebase-playground'...

```
i deploying database, hosting
✓ database: checking rules syntax...
✓ database: rules syntax for database malcolm-firebase-playground-default-rtdb is valid
i hosting[malcolm-firebase-playground]: beginning deploy...
i hosting[malcolm-firebase-playground]: found 2 files in public
✓ hosting[malcolm-firebase-playground]: file upload complete
i database: releasing rules...
✓ database: rules for database malcolm-firebase-playground-default-rtdb released successfully
i hosting[malcolm-firebase-playground]: finalizing version...
✓ hosting[malcolm-firebase-playground]: version finalized
i hosting[malcolm-firebase-playground]: releasing new version...
✓ hosting[malcolm-firebase-playground]: release complete
```

✓ Deploy complete!

Project Console: <https://console.firebase.google.com/project/malcolm-firebase-playground/overview>
Hosting URL: <https://malcolm-firebase-playground.web.app>
champ@ictadmins-MBP firebase-web %

