# Attendance

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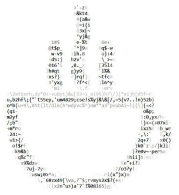

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# Software Saturdays

## Spring 2023 - Lesson 7

## NoSQL Databases

# Review of the Beginner Track

- 5 Lessons
  - HTML/CSS
  - JavaScript
  - JSX and Intro to ReactJS
  - More ReactJS
  - APIs and ReactJS
- 2 Project Days

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# Review of the Intermediate Track

- 5 Lessons
  - JSX and Intro to ReactJS
  - More ReactJS
  - APIs and ReactJS
  - Functional Components and Async Code
  - NoSQL Databases
- 2 Project Days

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# Help Available

- Weekly Learning Sessions
  - Every Saturday at 3:30pm EST
- Recorded Learning Sessions
  - Every Sunday
- Weekly Open Review Hours
  - Every Wednesday at 6:00pm to 7:00pm
- Slack Channels
  - Every Day

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# Before We Begin

All content is available on Brightspace

Join the Software Saturdays Slack!
https://softwaresaturdays.slack.com

1. #announcements
2. #general-discussion
3. #spring-2022-reactjs

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# Before We Begin

- Please have a text editor to open and edit code files
  - If you do not have one, Visual Studio Code is a good choice
  - https://code.visualstudio.com/download
- Demo files and examples are on GitHub
  - https://github.com/SoftwareSaturdays/2022-Spring-ReactJS

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# Before We Begin

- We need to install NodeJS and NPM
  - https://nodejs.org/en/download/
- NodeJS is a very customizable JavaScript toolbox
- NPM is a JavaScript package installer

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# Part 1: Review

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# Functional Components

- Functional components are just React components that are functions, not classes

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# Using Promises

- Call the promise function
- Attach success callbacks with `.then(...)`
- Attach failure callbacks with `.catch(...)`

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# Types of Functions

- Named functions
  - Normal function declaration
- Anonymous function
  - Function declaration with no name
- Arrow function
  - Lambda function, exists temporarily

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# Part Two: Databases

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# What is a database?

- A database is a way to store data in a central location
- Databases make it easy to synchronize this data across multiple users and platforms
  - E.g. Amazon has a database of products, YouTube has a database of videos, NYT has a database of subscribers

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# What is a database?

- For many years, **S**tructured **Q**uery **L**anguage was the standard for database programs
- It used a table approach where databases consist of tables with columns representing ‘fields’
  - E.g. the ‘Users’ table would have a column for name, one for email, one for password
    - (Don't actually do this, lots of problems)

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# What is a database?

- However, lots of data doesn't make sense to store in a rigid table
- Also, SQL can be slower for web applications and harder to distribute

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# What is a database?

- To meet these problems, NoSQL databases started appearing
- They do not have a set standard to storing data, it depends on the implementation
- Result: Very fast, easy to scale, easy to develop

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# NoSQL Databases

- There are a lot of different NoSQL databases
- The one we will use is Firebase Realtime Database
- It is easy to use and setup

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# Part Three: Firebase

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# What is Firebase?

- Firebase is a Google development system used for prototyping and small applications
- Firebase has a lot of useful features, but we will only use the Realtime Database

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# Realtime Database

- Realtime Database stores things using a JSON structure
- Everything must be a key-value pair or a key-JSON pair
- Since JavaScript handles JSON well, it is easy to handle the data from Realtime Database

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# Demo #1

How to set up Firebase

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# Checkpoint #1

Set up Firebase on your computer

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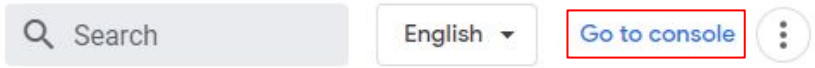
# Setting up a Firebase Account

- Go to https://firebase.com and click “Go to console” in the upper right corner
  - Requires a Google account



# Setting up a Firebase Account

- In the center of the screen, press "Create a project" (or "Add project" if this is not your first)
- Give your project a name and press “Continue”
- Deselect “Enable Google Analytics” and press “Create Project”

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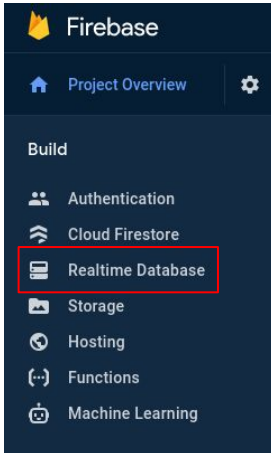
# Setting up a Firebase Account

- After project creation, on the left, go to “Realtime Database”



# Setting up a Firebase Account

- Click “Create Database” and then “Next”
- Select “Start in **test mode**” and press “Enable”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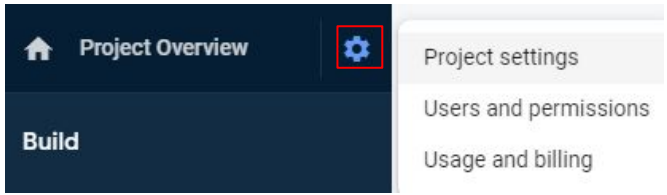
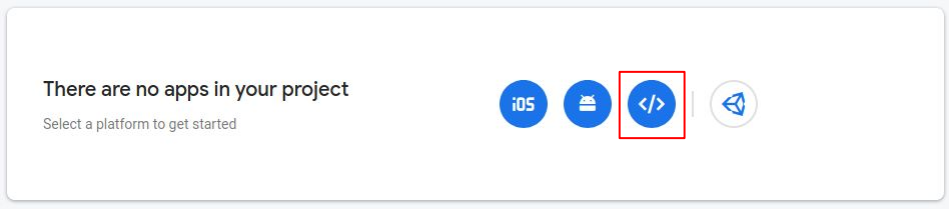
# Setting up a Firebase Account

- On the left, press the Setting gear and select Project Settings



# Setting up a Firebase Account

- In the “Your apps” section, choose a new website



# Setting up a Firebase Account

- Give your website a nickname and press “Register app”
- Select "Use NPM under "Add Firebase SDK
- COPY the code in the box
  - Paste it somewhere for reference if you don’t need it now

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# How Does Firebase Store Data?

- As a JSON object
- Use the `data.json` file (provided on Github in the lesson7 branch) to see an actual example database
- Import the data into Firebase
- In the Realtime Database menu, press the 3 dots and “Import JSON”

# A note about security

- Your database is in “test mode”
- ANYONE can write or read to it for 30 days
- **DO NOT PUBLISH A DATABASE LIKE THIS ON THE WEB**
- If you intend to use this afterwards, look into Firebase Rules

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# Part Four: JavaScript

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# Using Firebase in your React project

- All functions for Firebase must be imported from the appropriate 'namespace'
  - 'firebase/app' has the core setup functions
  - 'firebase/database' has the database functions

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# Adding Firebase to your React project

- Copy and save the Firebase config
- When using Firebase through an NPM project, install the Firebase SDK (Software Development Kit) version 9
  - `npm install firebase`

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# Using Firebase in your React project

In a ./src/database.js file...

```
import { initializeApp } from 'firebase/app';
import { getDatabase } from 'firebase/database';
// TODO paste config here...
const app = initializeApp(firebaseConfig);

const database = getDatabase(app);
export { database };
```

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# What is a CRUD app?

a. **C**reate
   - Create and store data

b. **R**ead
   - Read available data

c. **U**pdate
   - Update existing data

d. **D**elete
   - Delete existing data

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# Proper Web Development Practices

- Proper web apps must follow a set of principles for user actions
- These actions are collectively called CRUD
- Your final project must implement all of these actions

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# Using Firebase in JavaScript

- All data actions need a 'reference'
- The reference tells Firebase where in the JSON object you are pointing
- Each key is an entry in the reference path

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# Using Firebase in JavaScript

- '/spring2023' is a reference to the spring2023 child keys
- '/spring2023/final' is a reference to the spring2023->final data

```
import { ref } from 'firebase/database';
const dataRef = ref(database, '/path/to/data');
```

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# Creating data in Firebase

- After importing your database and creating a reference
- Import the 'set()' method from 'firebase/database'
- 'set()' takes two parameters:
  - The ref
  - The data to store at that ref
    - an actual value or an object of other values

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# Reading data in Firebase

- Import the 'onValue()' method from 'firebase/database'
- 'onValue()' takes two parameters:
  - The ref
  - A callback function after the data is run
- 'onValue()' will run the callback function every time the ref is updated

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# Updating data in Firebase

- After importing your database and creating a reference
- Import the 'update()' method from 'firebase/database'
- 'update()' takes two parameters:
  - The ref
  - The data to update at the ref

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# Deleting data in Firebase

- After importing your database and creating a reference
- Import the 'remove()' method from 'firebase/database'
- 'remove()' takes one parameter:
  - The ref

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# set() vs update()

- set() destroys all data stored at the ref previously
- update() only updates or adds data, nothing is destroyed

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# Demo Program #2

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# Loading data with React

- Put the database read in useEffect()

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# Loading data with React

- Careful: you must make sure to deactivate the 'onValue()' callback before leaving the page
- Call off() function in return callback function in useEffect()

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# Demo Program #3

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# Checkpoint #2

See next slide for instructions

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# Checkpoint #2

Using Firebase, display the contents of the example data using a React component.

Add some buttons and text boxes to add or remove data from the database.

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# Thanks for coming!

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