

Unit 9 Firebase

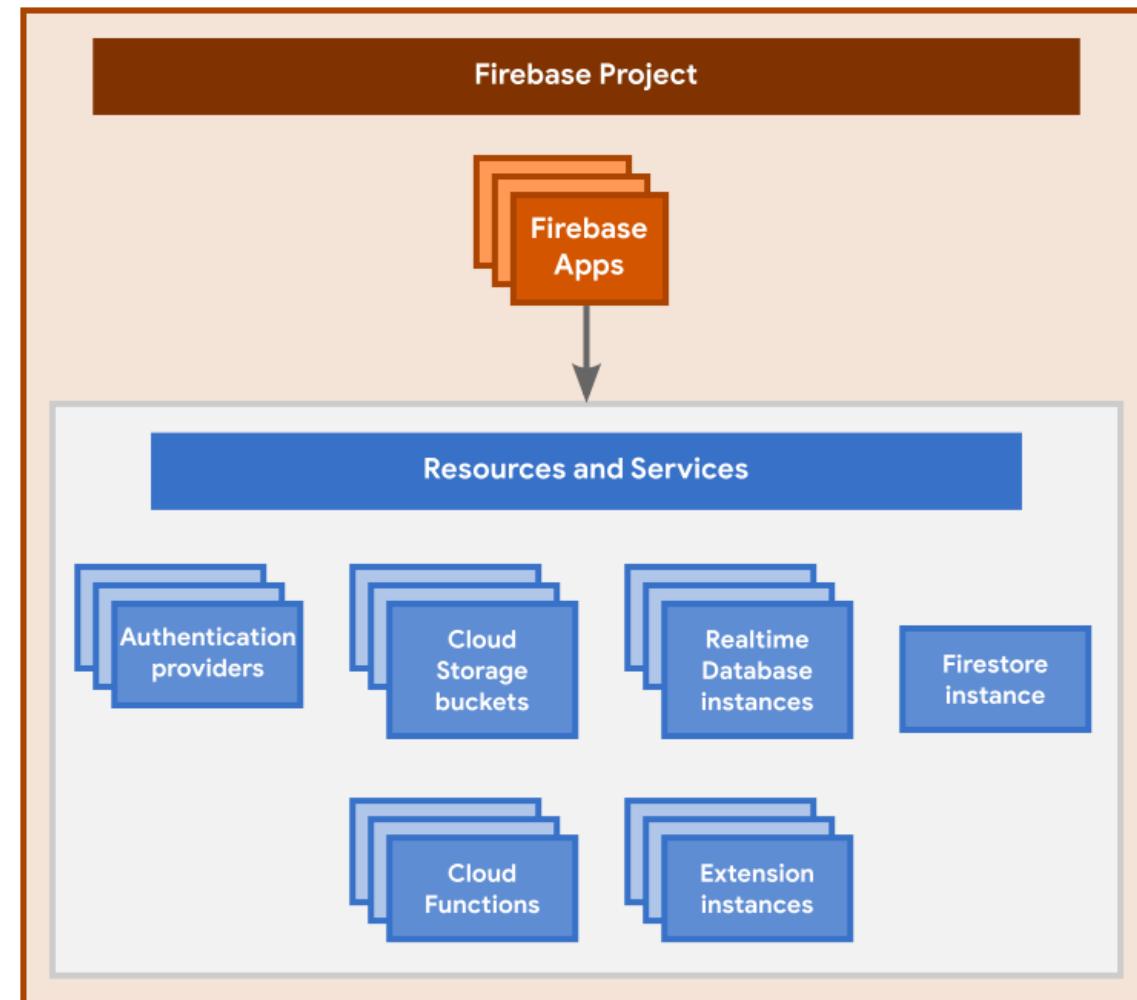
Configure Firebase, Add Firebase to Android App, Components of Firebase, ML Kit, Vision, APIs of ML Kit

Introduction of Firebase

- Learn Fundamentals of Firebase from below URL
- <https://firebase.google.com/docs/guides>
- Firebase Console URL:
- <https://console.firebaseio.google.com>
- Firebase for Android:
- <https://firebase.google.com/docs/android/learn-more>
- Firebase Pricing:
- <https://firebase.google.com/pricing>

Firebase Projects

- <https://firebase.google.com/docs/projects/learn-more>
- A **Firebase project** is like a container for all your apps and any resources and services provisioned for the project.
- A Firebase project is the top-level entity for Firebase. In a project, you can register your Apple, Android, or web apps.
- After you register your apps with Firebase, you can add the Firebase SDKs for any number of **Firebase products**, like Analytics, Cloud Firestore, Performance Monitoring, or Remote Config.



Components of Firebase

- <https://firebase.google.com/products-build>
- **Authentication:** An end-to-end user identity solution in under 10 lines of code
- **Cloud Firestore:** Realtime updates, powerful queries, and automatic scaling
- **Storage:** Store & retrieve user generated content
- **App Check:** Protect your API resources from abuse
- **App Hosting:** Deploy full-stack web apps at global scale
- **Data Connect:** Connect your app to a PostgreSQL database with a powerful managed app server
- **Realtime Database:** Store and sync data in realtime
- **Crashlytics:** Track, prioritize and fix stability issues that erode app quality, in realtime
- **Cloud Messaging:** Cross-platform push messaging infrastructure between your servers and user devices

Modules of Firebase

- **Extensions:** Pre-packaged solutions that save you time
- **Cloud Functions:** Extend and connect Firebase features
- **Hosting:** Deploy web apps in seconds
- **Machine Learning:** Solve common problems in your apps with machine learning
- **A/B Testing:** Improve key flows & notifications
- **Analytics:** Measure & analyze user engagement
- **App Distribution:** Distribute pre-release app versions
- **Dynamic Links:** Deep link potential users to the right place inside your app
- **In-App Messaging:** Send messages to engage the right users at the right moment
- **Performance:** Get insights into your app's performance
- **Remote Config:** Slowly and safely roll out new features in your app without deploying a new version
- **Test Lab:** Test on a range of devices

Add Firebase to your Android project

- Follow instructions mentioned in below link:
- <https://firebase.google.com/docs/android/setup>
- Firebase android Learn more:
- <https://firebase.google.com/docs/android/learn-more>

Steps to create Android Chat app by using Firebase

- Follow step by step instructions as mentioned in below link:
- <https://firebase.google.com/codelabs/firebase-android#0>

Set up a user authentication flow with Authentication

- Setup firebase authentication by using steps mentioned in below link:
- <https://firebase.google.com/docs/auth/android/start>

Store data, like user information, with Cloud Firestore

- Setup firestore by using steps mentioned in below link:
- <https://firebase.google.com/docs/firestore/quickstart>

Store data, like user information, with Realtime Database

- Setup **Realtime Database** by using steps mentioned in below link:
- <https://firebase.google.com/docs/database/android/start>

Store files, like photos and videos, with Cloud Storage

- Setup **Cloud Storage** by using steps mentioned in below link:
- <https://firebase.google.com/docs/storage/android/start>

Trigger backend code that runs in a secure environment with Cloud Functions

- Setup **Cloud Functions** by using steps mentioned in below link:
- [https://firebase.google.com/docs/functions/callable#call the function](https://firebase.google.com/docs/functions/callable#call_the_function)

Send notifications with Cloud Messaging

- Setup **Cloud Messaging** by using steps mentioned in below link:
- <https://firebase.google.com/docs/cloud-messaging/android/client>

Find out when and why your app is crashing with Crashlytics

- Setup **Crashlytics** by using steps mentioned in below link:
- <https://firebase.google.com/docs/crashlytics>

Gain insights on user behavior with Analytics

- Setup **Analytics** by using steps mentioned in below link:
- <https://firebase.google.com/docs/analytics/android/start>

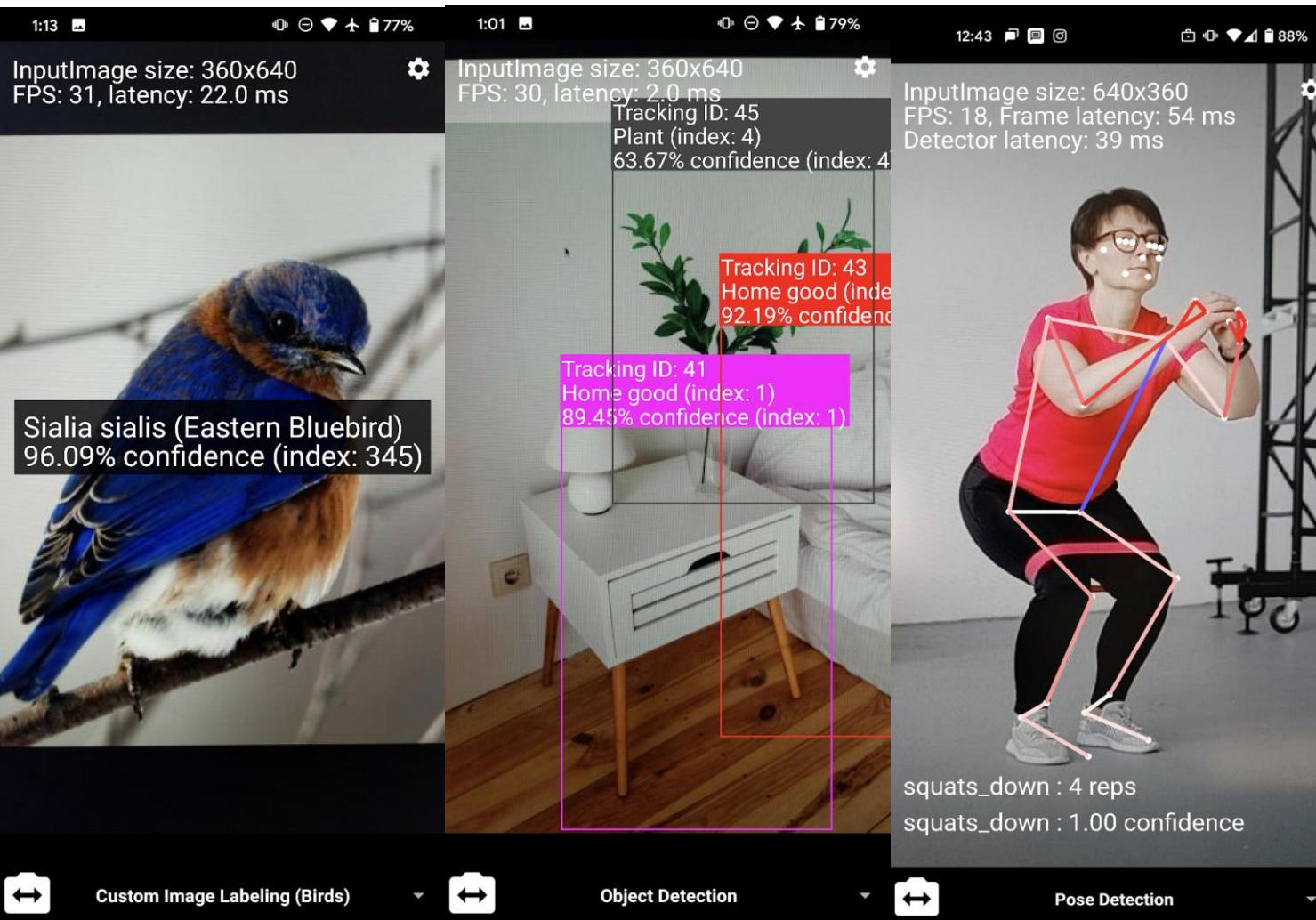
Firebase ML Kit

- <https://developers.google.com/ml-kit/guides>
- Use on-device machine learning in your apps to easily solve real-world problems.
- ML Kit is a mobile SDK that brings Google's **on-device** machine learning expertise to Android and iOS apps.
- Use our powerful yet easy to use Vision and Natural Language APIs to solve common challenges in your apps or create brand-new user experiences.
- All are powered by Google's best-in-class ML models and offered to you at no cost.

Firebase ML Kit APIs

- Explore the ready-to-use APIs:
 - [text recognition](#)
 - [face detection](#)
 - [barcode scanning](#)
 - [image labeling](#)
 - [object detection and tracking](#)
 - [pose detection](#)
 - [selfie segmentation](#)
 - [smart reply](#)
 - [text translation](#)
 - [language identification](#)

Firebase ML Kit APIs



Firebase ML Kit APIs

- Learn how to use custom TensorFlow Lite image labeling models in your apps. Read [Custom models with ML Kit](#).
- Take a look at our [sample apps and codelabs](#). They help you get started with all of the APIs.
- <https://github.com/googlesamples/mlkit/tree/master/android/vision-quickstart>
- The Mobile Vision API is now a part of ML Kit
- Courses to Learn more:
 - <https://developers.google.com/learn?category=aiandmachinelearning>
 - <https://firebase.google.com/docs/ml/codelabs>

Custom models with ML Kit

- <https://developers.google.com/ml-kit/custom-models>
- TensorFlow Hub offers a wide range of pre-trained image classification models - from various model creators - that can be used with the Image Labeling and Object Detection and Tracking APIs.
- <https://www.kaggle.com/models?tfhub-redirect=true>
- [https://ai.google.dev/edge/litert/libraries/modify/image classification](https://ai.google.dev/edge/litert/libraries/modify/image_classification)
- **Follow these steps:**
 - Pick a model from the [collection of ML Kit compatible models](#).
 - Download the `.tflite` model file from the model details page. Where available, pick a model format with metadata.
 - Follow our guides for the [Image Labeling API](#) or [Object Detection and Tracking API](#) on how to bundle model file with your project and use it in your Android or iOS application.

Custom models with ML Kit

- **TensorFlow Lite model compatibility**
- You can use any pre-trained TensorFlow Lite image classification model, provided it meets these requirements:
- Tensors
 - The model must have only one input tensor with the following constraints:
 - The data is in RGB pixel format.
 - The data is UINT8 or FLOAT32 type. If the input tensor type is FLOAT32, it must specify the NormalizationOptions by attaching Metadata.
 - The tensor has 4 dimensions : BxHxWxC, where:
 - B is the batch size. It must be 1 (inference on larger batches is not supported).
 - W and H are the input width and height.
 - C is the number of expected channels. It must be 3.
 - The model must have at least one output tensor with N classes and either 2 or 4 dimensions:
 - (1xN)
 - (1x1x1xN)
- Currently only single-head models are fully supported. Multi-head models may output unexpected results.

Firebase Android Sample App Code

- <https://github.com/firebase/quickstart-android>

Sample Questions

- Explain All (Some) Components (Modules/Products) of Firebase with example.
- Explain ML kit of Firebase with example.
- Write down steps for custom model of ML Kit.
- Write down steps to setup firebase for android app.
- Write down Functionality, User engagement, and App Stability of each components of firebase in android mobile application development.
- Write down about component of firebase which is responsible to give information about android app crash.
- Write down about component of firebase which is responsible about user engagement from different countries.