University of Mila
Computer Science Department

Third-year Bachelor
Mobile Applications Course

Chapter 2

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2025/2026

What is a platform in computer science?

Literally, a platform is something on which you put something else

A platform refers to a foundation or structure that enables multiple components, applications, or technologies to interact and work together

It serves as a base upon which other **software** or **hardware** can be built

- Social media: such as Facebook, Twitter, Instagram, and LinkedIn.
- E-commerce platforms: e.g., Amazon, Bol.com, and Alibaba.
- Online marketplaces: e.g., Etsy and eBay.
- Crowdfunding platforms: e.g., Kickstarter and Indiegogo.
- Online education platforms: e.g., Coursera and Udemy.
- Online gaming platforms: e.g., Steam and Xbox Live.
- Online streaming platforms: e.g., Netflix, YouTube, and Spotify.


moodle


Abdellaoui Abderrahim عبد اللاوي عبد الرحيم
27 février, 19:03 ·
ان تصبر وتجتهد وتثابر، ويوفقك الله بأن ترى ما كنت تتمناه قبل اربع سنوات يتحقق على ارض الواقع مع yinvesti
اللهم نسألك النجاح في أداء المهمة
#سنحيا_كراما
التمويـــل الجماعي

Development platforms, like Android Studio, help developers create mobile applications.
They provide tools such as SDKs, libraries, and APIs.

These tools make application development easier, help with testing, and ensure that apps work on different devices and operating systems

- ✓ Launched in 2007
- ✓ Uses the Linux kernel
- ✓ Open-source
- ✓ Designed for mobile devices
- ✓ To create an application for the platform, it requires the Android SDK, which includes development tools and APIs.

To shorten development time, Android developers usually integrate the SDK into an IDE (Integrated Development Environment)

A set of tools provided with a hardware platform, an operating system, or a programming language

It allows software developers to create applications **specific to that platform**, **system**, or **programming language**
It is like a **Toolbox**

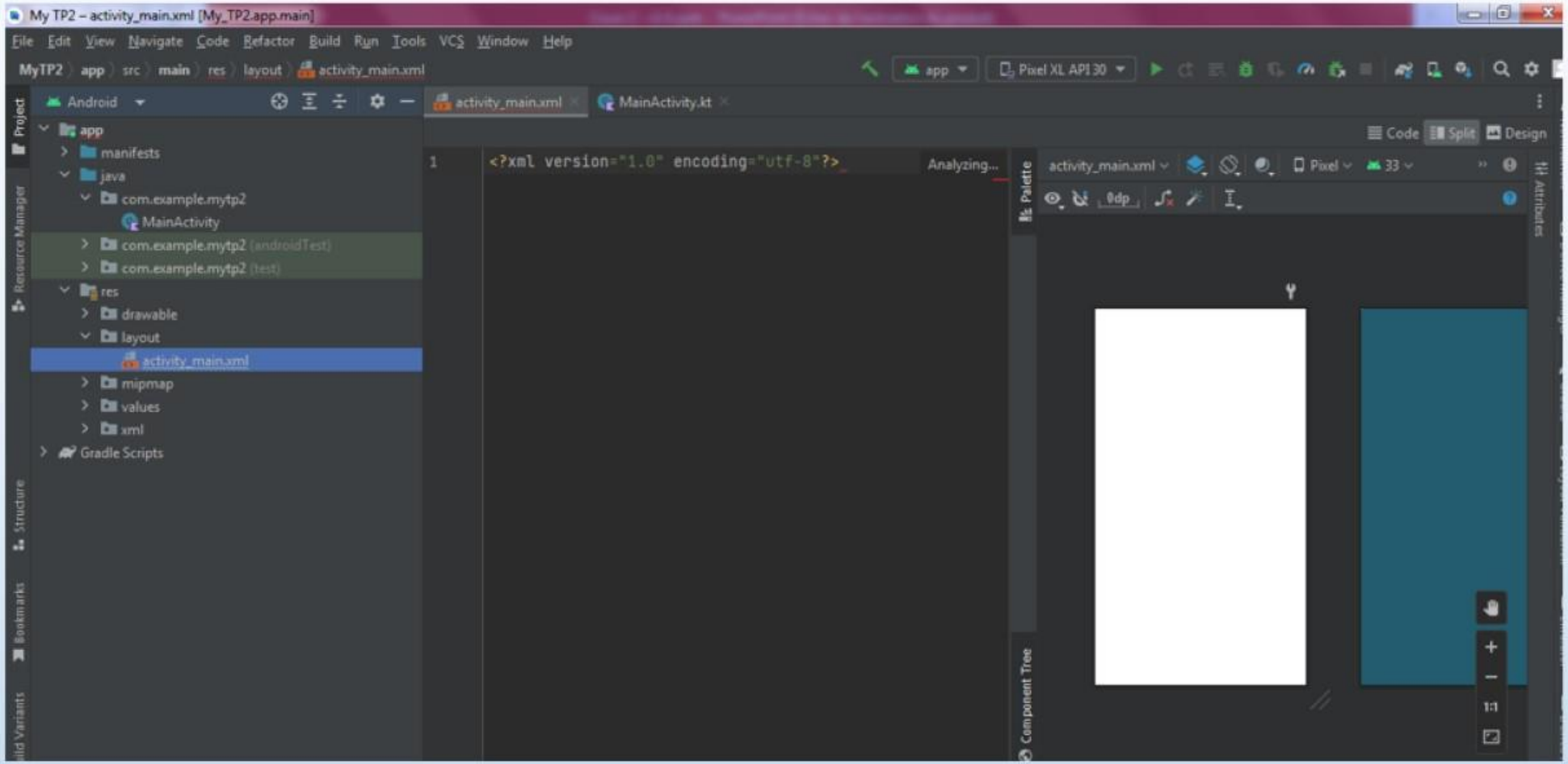
The Android SDK is a set of tools used to create Android applications.
It helps developers build apps for the Android platform

- ✓ It was first announced in 2013.
- ✓ It is the official IDE for Android applications.
- ✓ It is based on IntelliJ IDEA.
- ✓ It provides one environment for all Android devices.
- ✓ It is developed by Google.
- ✓ Since 2014, Google recommends it for Android development.
- ✓ Since 2019, Kotlin is the recommended language for Android apps.

Installation and configuration of tools Lab Session

Exigence	Minimum	Recommandée
OS	Microsoft Windows 8 64 bits	Dernière version 64 bits de Windows
RAM	8 Go de RAM	16 Go de RAM ou plus
Processeur	Architecture de processeur x86_64, Intel Core (2e génération ou version ultérieure), ou processeur AMD compatible avec Windows Hypervisor Framework	Processeur Intel Core de dernière génération
Espace disque	8 Go (IDE, SDK Android et Android Emulator)	Disque dur SSD de 16 Go ou plus
Résolution d'écran	1 280 x 800	1 920 x 1 080 pixels

In the lab session
we covered the installation of
Android Studio


My TP2 – activity_main.xml [My_TP2.app.main]
File Edit View Navigate Code Refactor Build Run Tools VCS Window Help
MyTP2 app src main res layout activity_main.xml
app
Pixel XL API 30
Android
activity_main.xml
MainActivity.kt
Code Split Design
app
manifests
java
com.example.mytp2
MainActivity
com.example.mytp2 (androidTest)
com.example.mytp2 (test)
res
drawable
layout
activity_main.xml
mipmap
values
xml
Gradle Scripts
1 <?xml version="1.0" encoding="utf-8"?>
Analyzing...
Palette
Component Tree
Attributes
Pixel
33
0dp

- Install the latest version of Android Studio (**Otter**)
- Check the build number
- Enable USB debugging on your device

Create an Android emulator

The documentation is readily available on YouTube, search engines, and other online resources.

Creating your first Android app

Lab Session

Running an Empty Application on a **Smartphone** or **Emulator**

Hello Android

Did you know?

Did you know?

You may encounter smartphones whose main sensor is equipped with 100 megapixels

Does a 100-megapixel sensor produce images that are 10 times more detailed than those from a 10-megapixel sensor?

In smartphones, sensor sizes generally range from about 1/3" for the smallest ones to 1/1.3" for the largest.
(*08/2022*)

Did you know?

When the sensor is particularly small, placing a large number of **photosites** on a limited surface creates image interference. This results in “digital noise,” which blurs the edges of details and affects the colors of the image.

Moreover, the size of the **photosites** may vary. A larger sensor can accommodate larger **photosites**. These will absorb a greater amount of light and produce more data, resulting in better photo quality, including in low-light conditions when lighting is poor.

Did you know?

In fact, the size of the photosites is so crucial for image quality that many smartphones are equipped with a technology called

Pixel Binning

(Quadpixel in Sony, Tetracell in Samsung and Xiaomi).

This technique groups several pixels
(3, 4, or 9, depending on the method)
together to create a larger “super pixel.”

When this mode is enabled, the resulting image is of higher quality.

This effectively reduces the number of pixels compared to what the manufacturer advertises. For example, on a Xiaomi Mi 11 or a Samsung S21 with a 108 MP sensor, a photo taken in pixel binning mode will ultimately result in an image of 12 MP to 16 MP.

One of the most crucial factors to consider when developing an Android application is

the responsiveness of the user interface

It is very important that your application displays correctly on all types of devices.
Mobile devices can have **different screen sizes** as well as **different pixel densities**

Using **constant** values to define sizes when designing the user interface of an Android application may sometimes make the app look **good on some devices**, but **appear inconsistent or awkward on others**

To avoid such issues, the Android team developed the concept of **density-independent pixels** (dp or dip) and **scale-independent pixels** (sp) to define sizes.

Pixel – The smallest **addressable** element in an image

1 Megapixel = 1 Million Pixels

1920 x 1080 → Full HD

3840 x 2160 → 4K

Number of pixels
(*The dots that make up an image*)
displayed on the screen

Pixel density
The number of pixels in a given area,
conventionally measured per inch (1 inch = 2.54 cm)

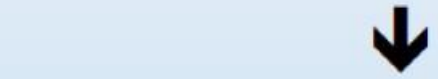
Generally, for image resolution, we specify
the **number of pixel lines** in
the width and height of the image
(Width × Height).
Example: **1920 × 1080** → **Full HD resolution**

Full HD TV

screen1920 × 1080 = 2,073,600 pixels, or 2.07 MP

Resolution, on the other hand, is expressed in pixels per inch (PPI).

Calculate the resolution of an
Ultra HD screen
3840 × 2160
55 inches



The result is ___ PPI

A 6" smartphone with 1080p has a high pixel density (~400 PPI), so the image is **sharp**

A 55" TV with 1080p has a low pixel density (~40 PPI), so the image may appear **pixelated**

Pixel density (PPI) determines the true sharpness of the screen's details, because it depends on the physical size of the display

Image definition (Width × Height) only indicates the total number of pixels and does not take screen size into account

Therefore, it is entirely possible to have a screen with high definition but low pixel density, and vice versa.

These units of measurement correspond to a concrete dimension
(physically measurable)

The three main units are millimeters (mm), inches (in), and points (pt)

- 1 in = 72 pt (There are 72 points in an inch.) ;
- 1 in = 25,4 mm (One inch is 2.54 cm) ;
- 1 mm = 2,835 pt.

Using these units is a good way to create an interface whose visual size is consistent across all devices.

The only **drawback** is that they have a **fixed size**

↓

Using these units is therefore not recommended

Pixels are also a physical dimension

This makes implementing “fluid” interfaces almost impossible

Moreover, since almost all screens have **different pixel densities**, a size in pixels may appear very large on one device and very small on another…

Even on the same device, a manufacturer can choose to change the screen resolution, resulting in the same model (for example, a 10" Galaxy Note) having two different resolutions (in pixels)

Therefore, dimensions in pixels should **be avoided** as much as possible.

The Android team developed the concept of using density-independent pixels (**dp** or **dip**) and scale-independent pixels (**sp**) to define sizes.

These units cannot be measured directly
Knowing the hardware → it is possible to convert from a physical unit to a virtual unit (or vice versa).

↓

Their main purpose is **to abstract away** the hardware, allowing developers to support
the **maximum number** of devices without having to **modify their interface**

Density Independent Pixels

Also called dip or dp, this is probably the most commonly used unit in Android

It corresponds to

"the number of pixels the interface would have on a 160 dpi screen (160 pixels per inch)".

$$\boldsymbol{px} = dp \times \frac{dpi}{160}$$

Ou

$$\boldsymbol{dp} = px \times \frac{160}{dpi}$$

The huge advantage of this measurement is that
it allows you to calculate a “visual” size

that is almost identical across all devices,

completely independent of their resolution or physical size.

Thus, all devices will have a screen width/height expressed in dp.

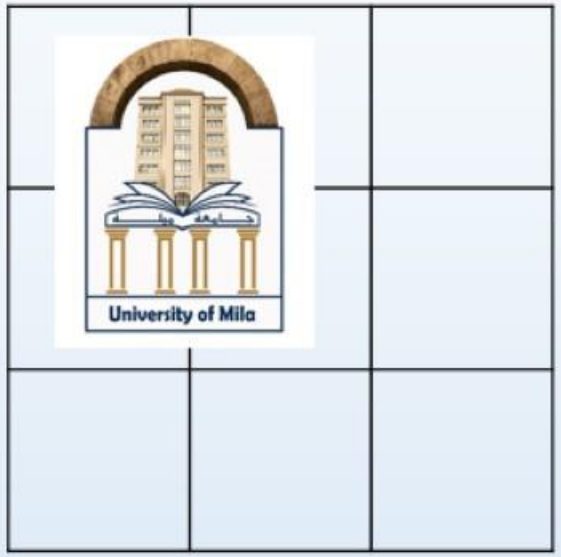
Scale Independent Pixels

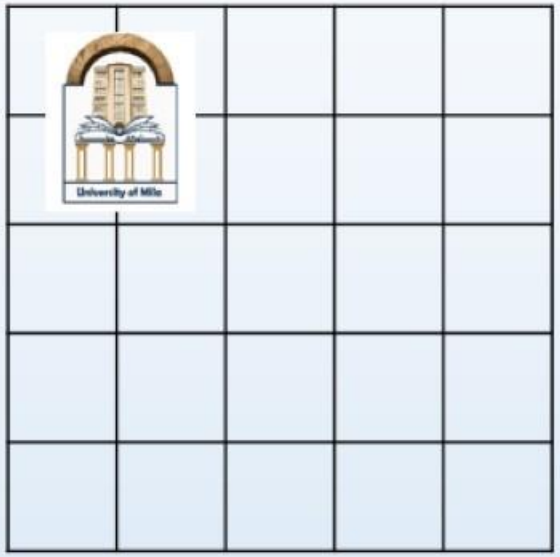
Another “virtual” unit is sp.

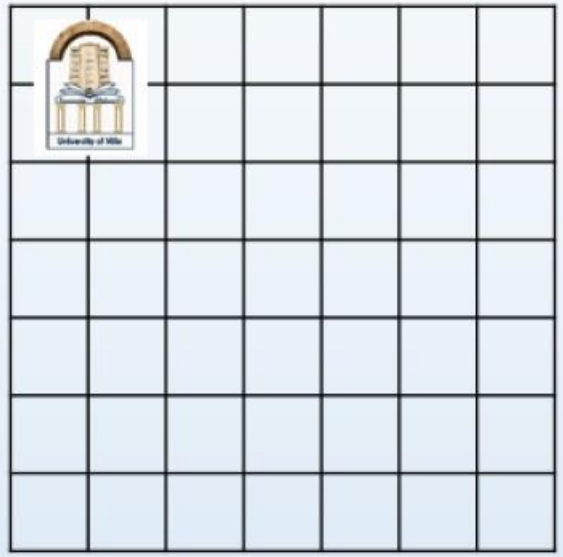
This size is based on dp but takes into account the user’s choice for text size

It is particularly important for users who require accessibility aids!

By default, 1 dp = 1 sp,
but if the user chooses a different text size,
we have: 1 dp = f × 1 sp
(where f is the text scaling factor)







The component appears smaller because the screen has a higher number of pixels (devices with higher pixel density)

It appears larger because the screen has fewer pixels (devices with lower pixel density).

Test

Button width: 300 px

7” HD screen (**1280 × 720**)

Density of ~**210 PPI**

1.43 inches

7" 4K screen (**3840 × 2160**)

Bouton largeur 300 dp

7" HD screen (**1280 × 720**)

Density of **~210 PPI**

394 px

4.77 cm

7" 4K screen (**3840 × 2160**)

Density of **~630 PPI**

1181 px

4.76 cm

Bouton largeur 300 dp

7" 4K screen (**3840 × 2160**)

Density of **~630 PPI**

1181 px

4.76 cm

55" 4K screen (**3840 × 2160**)

Density of **~80 PPI**

150 px

4.76 cm

Device-independent pixels (dp)

If the device-independent pixel (**dp**) is used as the unit of length,

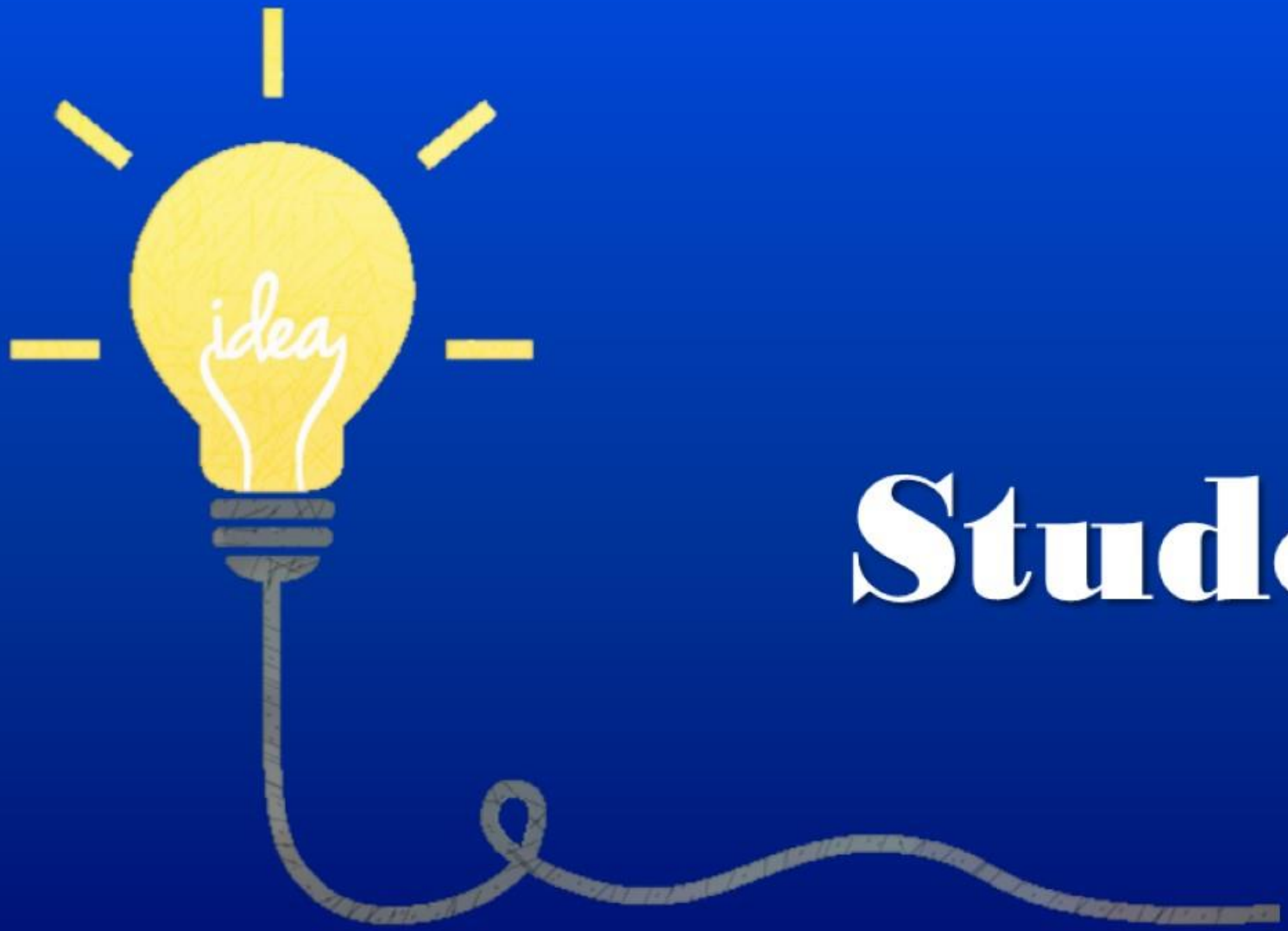
the device's operating system maps the **dp** value to a corresponding number of pixels based on the screen resolution of the device

Scale-independent pixels (sp)

A scale-independent pixel (sp) is identical to a device-independent pixel (dp) with an additional factor based on the **font size the user selects in the device's system settings**

Scale-independent pixels should be used only as the unit for text
Avoid using sp as a unit for non-textual components.

Project



Student ideas

BOUTERNIKH Imane

I would love to learn how to build an app from scratch

Bendjaffer Aymen ammar

موزع سلع بلجملة للمواد الغدائية اي صاحب المحل يمكن من تطبيق ان يطلب سلع وتصله لمحله لتسهيل لان اصحاب المحلات اغلبهم لا يملكون وقت لشراء السلع

Merikhi Marwa

تطبيقات لتنكير كبار السن بأدويتهم , تطبيقات للتعرف على حالة الشخص النفسية من خلال ملامحه , تطبيقات تساعد على الانتاجية كمتتبع العادت اليومية او مذكرة محمولة, تطبيقات لقراءة و ادارة الكتب و اعطاء تلخيصات لها (كأنها مكتبة محمولة) , تطبيقات تساعد من لديهم مشاكل نفسية مثلا كتطبيق يتتبع المزاج كي يساعد المختص النفسي من معرفة الاضطراب , او تطبيق يبين كيفية التعامل مع بعض الحالات النفسية كنوبات الهلع , تطبيع للتعريف بثقافات الدول و طبيعتها للترويج للسياحة

Kechichou Sana

Je suggère d'introduire un esprit de compétition entre les membres du groupe pour rendre l'étude plus motivante.


Positive thinking will let you
do everything better than negative
thinking will.
YOU GOT THIS