# BCS 371 Mobile Application Development I

Arthur Hoskey, Ph.D.
Farmingdale State College
Computer Systems Department

# Brightspace

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- Brightspace is used in this class for:
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  - Downloading lab assignments
  - Submitting lab assignments
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- Show Hypothetical Situation slides now.

# A Hypothetical Situation

# Video

- https://www.youtube.com/watch?v=OrzgxUhnYjY

**Matrix Learning**

- Show the syllabus

# Syllabus

# Android Studio

- You MUST download and install Android Studio on your home computer **AS SOON AS POSSIBLE!!!**

- Link

https://developer.android.com/studio/index.html

Note: Android Studio uses Gradle when building programs. Gradle is automatically installed with Android Studio.

# Android

- Developed by Google along with the Open Handset Alliance.
- Built on a Linux kernel
- Runs on many mobile devices
- Can develop Android applications using all free software

**What is Android?**

- A free, open-source operating system for embedded devices.
- An open-source development platform for creating applications.
- Devices, particularly mobile phones, that run the Android operating system and the applications created for it.

# What Is Android?

## System Requirements

- ***Kotlin SDK***

  Must be able to create Kotlin programs.

- ***Android Studio***

  Integrated Development Environment (IDE) used to create Android applications. Android Studio uses the following:

  - ***Android SDK -*** Contains classes necessary to develop Kotlin programs that can run on Android.
  - ***Android Virtual Device (AVD) -*** Used to test the applications that you write instead of actually installing them on a mobile device.

# System Requirements

# What Comes in the Box

- The Android APIs — The core of the SDK is the Android API libraries that provide developer access to the Android stack.
  - These are the same libraries that Google uses to create native Android applications.
- Development tools — The Android SDK includes development tools for compiling and debugging your applications.

# What Comes in the Box

- The Android Virtual Device Manager and Emulator
  - The Android emulator is a fully interactive mobile device emulator featuring several alternative skins.
  - The emulator runs an Android Virtual Device (AVD) that simulates a device hardware configuration.
  - Using the emulator you can see how your applications will look and behave on a real Android device.
  - Hardware-neutral, it provides a better independent test environment than any single hardware implementation.
- Full documentation
  - The SDK includes extensive code-level reference information detailing exactly what's included in each package and class and how to use them.
  - Android's reference documentation and developer guide explains how to get started,
  - Gives detailed explanations of the fundamentals behind Android development
  - Highlights best practices
  - Provides deep-dives into framework topics.

## Gradle

- Gradle – Advanced build toolkit to automate and manage the build process.
- Android uses Gradle when building a app.
- Everything the app needs to be built is described in a Gradle file.

# Gradle

## Android Runtime (ART)

- ART responsibilities:
  - Compilation of Dex bytecode to machine code **at install time**. Takes Dex bytecode as input (Dex is similar to Java bytecode).
  - Memory allocation
  - Garbage collection
  - Other stuff

- Note: ART is a replacement for the Dalvik VM (Android 4.4 and earlier used the Dalvik VM).

# Android Runtime (ART)

# Optimized Memory and Process Management

- Android Runtime (ART) **manages memory** similar to Java and .NET VMs (uses garbage collection).
- **Android OS manages process lifetimes**. The is more than a traditional Java VM does.
- Managing process lifetimes helps Android ensure application responsiveness.
- **Android will stop and kill processes** as necessary to free resources (it may be running low on memory).
- Application that the user is interacting with generally has the highest priority.
- **Applications must be prepared to be killed quickly** and be able to restart easily.

## Android Hardware Support

Android supports (runs on) the following hardware platforms:

- Smartphones
- Tablets
- Televisions
- Other devices as well (watches, glasses, appliances)…

# Android Hardware Support

## Android Jetpack

- Android Jetpack is a suite of libraries.
- Helps developers follow best practices, reduce boilerplate code, and write code that works consistently across Android versions and devices so that developers can focus on the code they care about.

- Taken from:

https://developer.android.com/jetpack

# Android Jetpack

## Android UI Development

There are two main approaches to developing the user interface (UI) for an Android app:

- **Jetpack Compose** – Uses declarative code to describe the UI. Modern toolkit for building a native Android UI. Google is using this moving forward.
- **XML View based Layout** – Uses XML files to describe the UI. The XML is transformed into Java bytecode.
- This course will be using Jetpack Compose.

# Android UI Development

## Android Database - SQLite

- **SQLite** - Lightweight relational database (for each application).
- Each application database is sandboxed (content is available ONLY to the application that created it).
- SQLite does NOT have a database server like MS SQL Server or Oracle.
- SQLite is a local DB (not cloud-based). The database resides on the device.

Note: Content Providers supply a mechanism for the managed sharing of these application databases.

# SQLite Database

## Google Cloud Firestore

- **NoSQL database stored remotely on Google's servers (in the cloud).**
- Data is stored hierarchically (no tables/rows like a relational DB).
- Good for mobile app development.

# Google Cloud Firestore

# Review

- What is Android?
- What is Android based off of?
- Which device(s) does Android run on?
- What do you use to program apps for Android in this class?

- End of Slides

# End of Slides