Running an Android Emulator

Android emulators simulate virtual Android devices on a computer, eliminating the need of a physical device. Emulators provide almost all capabilities of a real device including simulating incoming phone calls and messages, network speeds, location, etc. These features allow applications to be tested between multiple emulators in the development stage given an APK file. An emulator can be used through its user interface or via the command line and console. To install an Android emulator, students need the SDK Manager. The following guidelines will help a student make an emulator and install an Android application's APK file.

- **Install Android SDK Package.** Download and installation instructions can be found here. Note that often the Android SDK is downloaded with integrated development environments (IDE) such as Android Studio. If using Android Studio, make note of the Android SDK path (Preferences→Appearance & Behavior→ System Settings→ Android SDK).
  - Add the the Android SDK location to your PATH using ~/.bash_profile or ~/.bashrc. Add the line:

    export ANDROID_SDK=/Users/myuser/Library/Android/sdk

  - Adding the Android SDK location to the PATH using the following command. It will allow you to run the built-in functions necessary to create emulators, such as adb.

    export PATH=$ANDROID_SDK/tools:$PATH

  - Note having multiple adb versions can cause an error . This can be checked by running *$adb version* in the command line. The version needed is located in the Android SDK platform-tools directory. If needed, copy adb from that directory into usr/bin.

- **Create an AVD.** Each instance of an emulator uses an Android virtual device (AVD) that allows users to specify the Android version and hardware of the simulated device. To create an AVD, use AVD Manager which is part of the Android SDK package. Available on the command line or within the IDE (Android Studio, Visual Studios Emulator, etc). When testing an application, it's recommended to use multiple emulators at once.
  - To create an AVD via command line:
    - Navigate to ~/<path to Android SDK>/tools/bin/ where the program avdmanager is.
    - Run:

      avdmanager create avd -n <name> -k <sdk_id> -p <path where AVD files will be created> --abi google_apis/<image> -d <device>

    - Example: ./avdmanager create avd -n "test" -avd Pixel_2_API_28

- To create an AVD in Android Studio
  - Launch Android Studio and navigate to Tools > AVD Manager.
    - Select create new device (or launch an existing one)
    - Select the desired device, and select any ABI and API from the list (download may be required).

- **Install APK File.** Installing APK files on an emulator can be done in various ways either on the command line or with the emulator itself.
  - Command line:
    - Place the APK file into Android SDK's platform-tools directory
    - Execute the command line/prompt below to the current open emulator's internal memory

      ./adb install <app apk>

      - To re-install, run the above commands with the -r argument
      - To install on the sd-card of the current opened emulator, adb can be run with the -s option
    - Installation is successful when application appears in the launched emulator.
  - Directly onto AVD
    - Launch the AVD and allow it to power on. Navigate to the emulator's home screen.
    - Drag and drop the APK file onto the emulator screen.
    - Installation successful when application icon appears on the emulator.