Maintenance of Android mode: SDK Downloader/Updater, Emulator, Library Structure for Processing Android

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Project Abstract

I propose to work on the following:

- Implement an up-to-date **SDK and Emulator installer**.
- Enhance the **SDK Updater** by adding options like individual package update and solving existing issues, like fixing the progress bar .
- Test and find solutions to existing issues with the **Android Emulator** across platforms and add new features the Emulator Creator.
- Improve the project structure of **Core Libraries and Library Template**, and work on / look into the conversion of Libraries to kotlin.

For any android based application, the SDK Installer/Updater/Emulator play an important role in **maintaining packages and essentially rendering** the output of the app. For any open source project it is essential to keep the project developer oriented and hence, re-structuring the library and library template on android standards is important.

Project Description

Maintenance of Android Mode :

This project proposal is based on the Maintenance of Android Mode concept as described in the Processing Foundation's [project list](). In summary, the proposed work in this documents is divided into 3 components: The revamping of the **up-to-date SDK installer**, cross-platform implementation and testing of the **Emulator** for the Processing Android mode and the structuration of the Processing Android **core libraries** and **Library templates** to align with current Android standards. This will play a significant role to permit Processing Android mode to keep up with the changes in the Android technology. The restructuration will also help defining a road map for the incorporation of Kotlin Native as a mode, which will permit users to target the iOS market, encouraging the next generation of developers. This exactly aligns with the core principles of the Processing Foundation to close the technological gap and bring programming to the masses

SDK downloader:

Currently, the getMainDownloadUrls method from mode/src/SDKDownloaders.java returns the URL of downgraded versions of the Emulator . The code base of this function also has scope for returning the downgraded URL for tools in the future. This function can be improved to handle XML structure changes of the repository in the future. Also, the above mentioned issues arise due to **array indexing of XPath Queries** without making proper validation tests. Validation should be made to check if the zip file link is latest or not.

Currently, the android mode downloads and uses **SDK 26**. This is not necessary as google always supports **backtracking** except in very rare situations such as the removal of ant support in SDK 25.3.1. I have also discussed this with Andres

(contributor and mentor), who also recommends this. (ProcessingForum/Andres_on_latestSDK)

As mentioned in a recent issue [#516](#516)(and a few other issues), the SDK installer causes issues on startup. These issues should be tested for across platforms, to analyse if it's an issue with the Swing component or with the mode itself.

The SDK Updater, currently installs all available updates or does not update at all. This does not allow the user to **manually install a particular package** alone. This can be implemented with a few tweaks to the tools/SDKUPdater class. As pointed out by issue [#362](#362), the progress bar in Updater is set to indeterminate mode, as a result of which the progress cannot be tracked properly by the user. This needs to be fixed by checking the android tools repository classes for solution.

The SDK Updater, also has **enhancement issues** as **reported by me** on [#523](#523), [#524](#524) which involves network connectivity detection and process completion callbacks.

The Emulator:
I would start working on it by testing the emulator on various platforms, and analysing issues ([#467](#467)). **Skia**, is a new rendering library that renders on to the screen faster and smoother, can be added to the emulator. **New options** to the emulator like:

- Choice of image to install,
- Resolution,
- Time - Zone,
- Orientation, [etc.](etc.) (Create something similar to this)

can be added to be configured on the first run of the emulator. Following this, the final work on the emulator would be to work on Emulator support for AMD processor. I will also be working on issues that have been reported on intel HAXM such as those mentioned in here.

Android Libraries:

Finally, convert the core library into an Android project as mentioned [here](). Currently the core library is structured in a way that does not follow android library project standards. Efforts has been made to convert the [Android Library template]() into an Android project that follows android standards. This will be done by progressively converting each of the 6 libraries and making a PR . I will follow a similar approach to convert the Library template into a properly structured Android project.

Development Process

Time period for community bonding (May 06 - May 26):
- Familiarise myself with the code base of PDE, Mode, Core libraries and the existing Library template .
- Interact with the mentor and decide upon the project structure for libraries, and contribute to the code base whenever possible .
- Identify more issues on the emulator across platforms , reported by various users.
- Analyse google's updates, to get an understanding of what feature upgrades / deprecations are being made in recent updates.

Coding Period (May 07 - August 25):
- **Phase 1** (May 27 - June 28) : **SDK Installer and Updater :** Improvement of the SDK Installer, analyse latest updates possible and make sure that the installer installs latest revisions of the packages , so that we download only the tested packages. Implement new features to the updater like individual package installations, fix the progress bar, handle progress complete callbacks and close pending issues.

- **Phase 2** (June 29 - July 26) : **Emulator and Core-Library :** Test various platforms for emulator issues, fix pending issues and work on support for AMD

processors. Implement new parameter additions mentioned in the abstract. Discuss with the mentors and start re-structuring the core library by converting it into an android project.

- **Phase 3** (July 27 - August 25) : **Core-Library and Library Template:** Evaluate the current definition of Android library templates. Design and execute a plan to incorporate it into the current structure of the Processing Android code. If time allows , I would also take up the work of the converting the complete library to Kotlin.
  Code Improvement: Improve the PDE code base by implementing swing workers , improve validations , open and close issues on PDE enhancement.

Timeline

Weeks 1-2 (May 27 - June 9) :
- Identify all existing downgraded download cases and verify if current and future upgrades of these packages are compatible with the mode.
- Start changing the SDK Downloader class to return recent zip files. Validation methods to check for latest version will be developed.
- Analyse the feasibility of replacing SDK 26 (high) and make sure that the code supports future SDK updates without breaking the code.
- Handle errors in various methods of SDK Downloader method such as mkdir errors. (Mentioned as TODO in the code base)
- Design and implement a user friendly UI for the Android SDK installer and updater.

Weeks 3-4 (June 10 - June 27):
- Initial changes will include option to update selected individual packages, process callbacks.

- Fix the progress bar issues , so that the final product will be a progress bar that is not in indeterminate mode.

- Fix network connectivity callbacks, and display proper message to users when connectivity is not available.

- Discuss with the mentor about UI changes that can be made to the updater, and start working towards it.

- With this, I will be submitting my changes to the SDK Downloader and updater as part of my phase 1 evaluation.

Weeks 4-5 (June 29 - July 13):
- There has been many issues reported on the emulator across various platforms. Collect information about these issues , and discuss with mentor on suggestions for the emulator.
- Test the mode and various platforms. (Cross-platform testing) .
- Look upon the feasibility of Emulator support for AMD Processor and look upon the necessary code changes.
- It has been reported that Intel's Hardware Acceleration is creating issues, look into this and solve it .

Weeks 5-6 (July 13 - July 25):
- Add new features that permit users to customize their emulator during launch as observed on the AVD manager in Android Studio: (Resolution, Orientation, Timezone etc)
- Based on Android standards , start a new android project and migrate the core libraries to support the new structure.
- This will involve migrating each of the 6 core libraries one by one , with reviews after every migration.
- Submit my works on the Emulator as part of my Phase 2 evaluation.

Weeks 6-7 (July 27 - Aug 16):

- Complete the core library work and integrate the existing debug mode and example projects to the new structure.
- Follow a similar project structure for the android library template repository.
- Implement the same procedure as above to change the structure of the android.

Weeks 7-8 (August 16 - August 25):
- As an additional part of my intern, I would also like to take a look into **Kotlin** conversion of the Core libraries.
- If time permits, I will start contributing to Kotlin conversion of core libraries. If not , I will come up with a Straw Man Proposal as this work can drive the next generation of mobile development with Processing on Android .
- If time permits, I will also help the community by completing TODOs present in the code base. This involves, error handling, converting runnable threads to Swing workers etc.
- My final part would be document all the new changes that I have made to the Downloader, Updater and Emulator.
- Submit all my contributions as part of my final evaluation.

More about you

I am an undergraduate student at the **National Institute of Technology, Tiruchirapalli (NIT Trichy)**, currently pursuing my second year. I have always shown great interest towards coding and learning more about it. I personally enjoy development (web and app) , as it poses as an amazing opportunity for people to see my work and appreciate the same. Having spent a lot of time reading and writing code, I have developed a steep learning curve.

My experience with Processing Android started when I started to use the library for developing apps in Android Studio. I used it to develop various sketches for the **Splash Screen** of my apps. I was more interested in it as it was cool to create something like particle.js in Android with ease. I even tried to develop a ping-pong game with the help of [TekGadg/ProcessingAndroid](#) videos and code examples.

Ever since I started talking on the forum, the community was very welcoming. I was amazed with the wiki changes made recently , so that students can easily understand the code base of the android mode and core library. All these kept me motivated towards working for processing android.

I'm a part of Delta Force, the premier coding club of NIT Trichy, where I work as a Full-Stack developer and System administrator. For the past 1 year, I have been working in deploying multiple servers and applications for the institution. I took part in several Capture the Flag competitions, including **inCTF** where I was among the **top 10 teams, all over India**. I also finished **4th**, in **Shaastra CTF** conducted by IIT Madras. I was involved in developing and organising **Pragyan CTF,** an ISO certified international Capture the flag event. As a developer, I have developed several Command Line Tools , and Android apps ([github/DeerajTheepshi](#)). **Aaveg**, a NodeJS based application with mongoDB was a fest based project which marks my web development venture.

The following are my contributions to the Open Source Community:

- **processing/processing:**
  - Pull Request made : [#5818](#) : A PR that informs the user about the status of package download.
  - Issue Raised: [#5822](#) : This issue was created and solved by the above PR
  - Issue discussed and looked into : [#5823](#)
  - Edited "Project - List" on Wiki : [#499336c](#)

- **processing/processing-android:**

- Created a pull request : [#525](#) : This PR , fixes an issue which involves informing the user about internet connection.
- Created an issue : [#523](#) : An SDK Updater based enhancement issue
- Created an issue: [#524](#) : An SDK Updater based enhancement issue
- Participated in discussion: [#362](#) : Working towards fixing the progress bar.
- Updated Build Instructions on Wiki : [#54f45ab](#)
- Updated Android Mode Structure on Wiki: [#3c8aa38](#)

- **Pythondotorg:**
  - Created an issue: [#1377](#) : Reported a dependency issue that was faced during setup.

I have already started to work towards some of these issues. I'm very much excited to start contributing to Processing Android and I can't wait to see my code reflected on the final product.

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