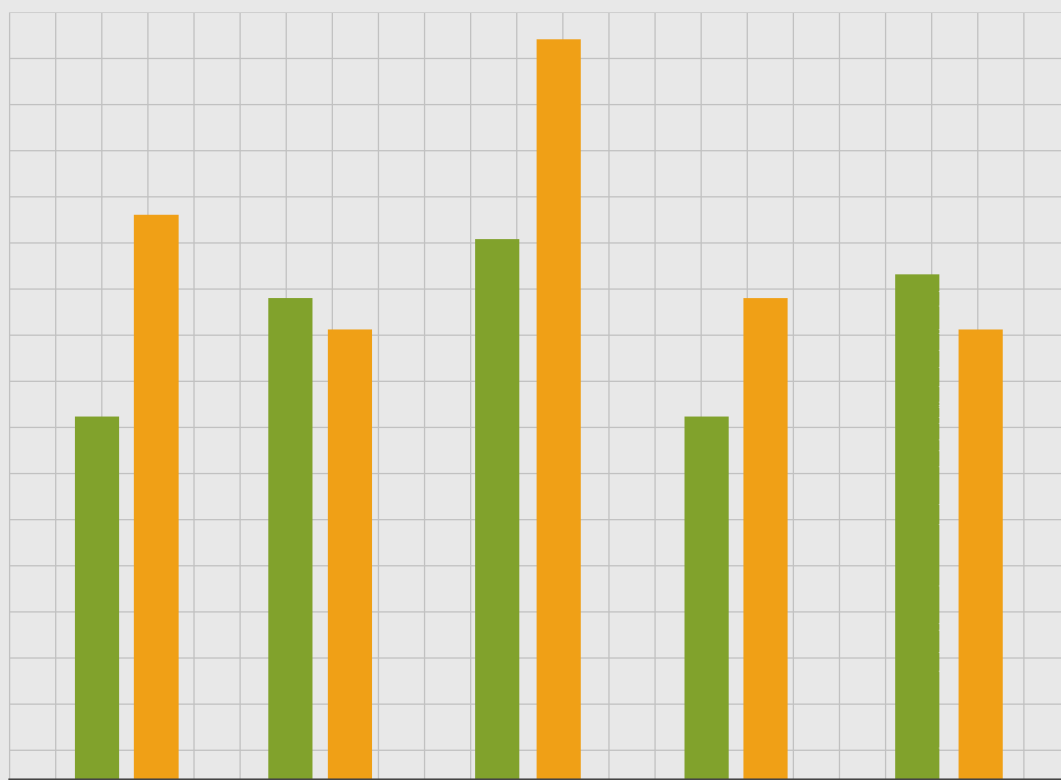




Hive
RESEARCH PAPER

BOSNA SEMA
EDUCATIONAL INSTITUTIONS
SARAJEVO COLLEGE
BOSNIA AND HERZEGOVINA



MENTOR

- SELMAN ESER

STUDENTS

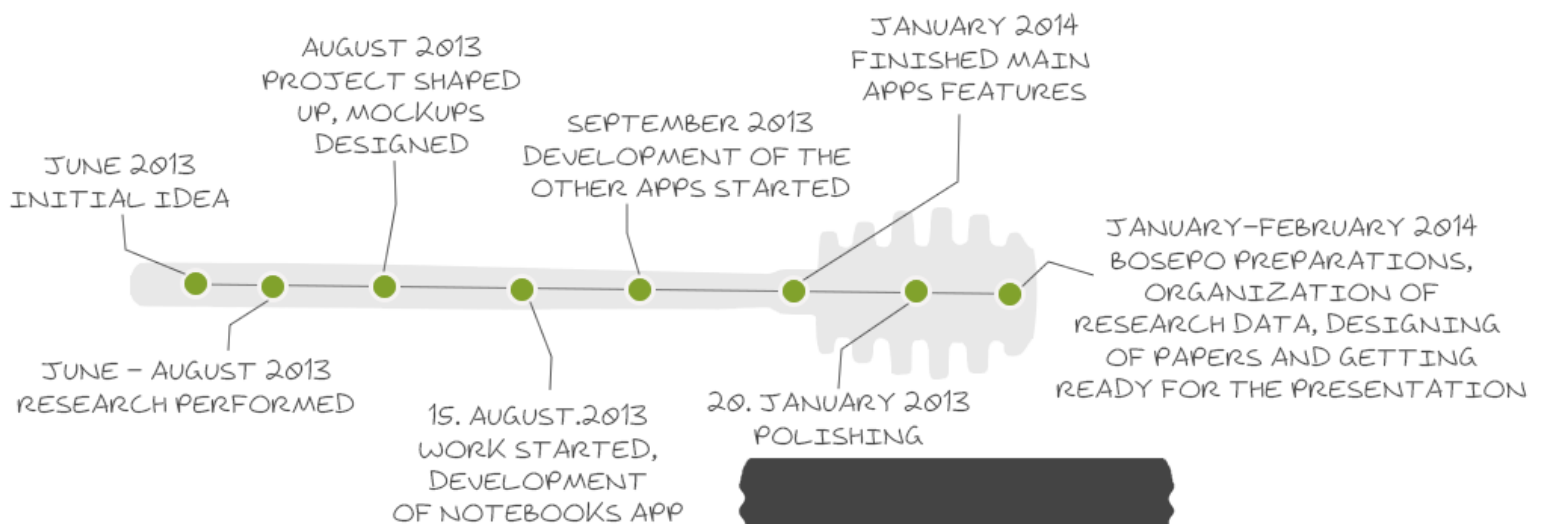
- IHSAN ISIK
- DŽANAN GANIĆ

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ABSTRACT

The question of whether or not to use tablets in schools has been going around for quite a long time now. There are those who support the idea and those who oppose it. Well, there were some issues with schools trying to use tablets so it's just understandable. When Los Angeles tried to integrate iPads into their schools, it only took a few days for the tablets to be jailbroken. In HIVE OS, however, these issues are eliminated. Hive provides a distraction-free study environment with its locked-up system and apps. Notebooks app kills the conventional keyboard input method and introduces hand-writing. All notebooks, books and other material students create in school are uploaded to the cloud and are made accessible from anywhere...



HIVE OS

Hive OS is an Android based operating system for educational tablets with a set of apps designed to make it easy for students to write, read and study on a tablet. It synchronizes students' data with the cloud allowing them to access their data from anywhere. Hive OS aims to solve some common issues that were experienced in attempts trying to integrate tablets in schools. You can find more information on these issues further in this paper.

PROBLEMS WITH USING TABLETS IN EDUCATION

Of course, there is nothing that is perfect. Using tablets in school brings some issues along with its advantages. According to a web article at digitalbookworld.com, one issue with using tablets in schools is the lack of budget. In a survey of more than 225 Kindergarten through grade-12 educators in the United States, 57% of responded selected “No budget to purchase apps/e-books” as the biggest challenge in integrating tablets in their lessons (Bacon, 2013). Another problem the article reported was the use of tablets in classrooms. In a survey by e-booksandkids.com, some educators expressed their concern about monitoring the use of the tablets. A teacher wrote about students visiting some non-class related websites, whereas, another commented on keeping students focused.

In September 2013 Los Angeles Unified School District began carrying out a \$50 million plan to equip 30,000 students in 47 schools from kindergarten through 12th grade with iPads, loading them up with software from Pearson (PSO) educational group and locking them down so that students couldn't wander around the Internet unchaperoned. It took only a few days for students at Westchester High School, in southwestern Los Angeles, to bypass the filtering software (Leonard, 2013). This obviously resulted in students with high-end devices in their hand that let them play games, access their social networking accounts, stream music, and simply do anything unrelated to their lessons. Another article on zdnet.com this fact. Another problem is theft. Personal tablet could easily be stolen from students. Loss of device is just another issue.

SOLUTIONS TO THE MENTIONED PROBLEMS BY HIVE AND OTHER SIMILAR PRODUCTS

#1 Cost

The money required to keep the product functional

Google Play for Education

Google Play for Education tablets come with several apps pre-installed google apps. You are able to install more apps using the play store. The issue here is that if the app you want to install is a paid app, you are required to pay the price for every individual tablet in your class or school. This can be really hard to maintain. Imagine a class of 24 students and you want to buy an app which costs \$3. You'd have to pay a total of \$72. And if you feel the need to buy some more additional apps between the price range of \$1-\$5... This can really become painful.

Intel Education Tablets

Intel Education Tablets come with pre-installed apps which let students read books, create presentations, get in contact with their teachers, etc. No extra apps area available. Thus, there is no other payment after the initial purchase.

HIVE OS

HIVE OS comes with a bundle of apps. A few of those are Notebooks, Books, and Drawings apps. These apps let students take class notes, read textbooks, and draw anything. There is no payment required. All of the apps and system source code is open. Anyone can purchase a supported device themselves and install HIVE software on it.

#2 Usage Restriction

Method(s) used to restrict device functionality in order to keep students on track and not let them lose focus by engaging in unrelated activities (e.g., browsing unrelated websites, playing games, listening to music)

Google Play for Education

Teachers are allowed to select the apps which they want to be made available to students. Other than that the system is exposed.

Intel Education Tablets

Teacher can control students by disabling certain functions for the students and monitoring what they are doing.

HIVE OS

The Android source code is modified in a way that it keeps students away from system settings, file system, background apps, app settings, etc. It has a custom launcher/home screen app which only lets users navigate to a few allowed apps. It also limits the information that is shown to the student.

#3 System Hacking/Jailbreaking

Google Play for Education

Tablets aren't distributed to students. They remain in classroom at the end of the day. Thus, making hacking the system impossible.

Intel Education Tablets

Tablets are distributed to students. Students take their tablets home after they are done with classes. Having enough time, opportunity, and material at home, hacking the system isn't that hard.

HIVE OS

Tablets remain on the desks. No tablet is a student's property. Students are required to log in by showing their NFC-enabled ID cards as they enter different cabinets. HIVE OS then downloads their data from the cloud and lets them work on it. As they are done with whatever they are doing and proceed with logging out the system then uploads the changes and logs them out of the device deleting their local data in the meantime.

#4 Theft

Google Play for Education

As mentioned earlier, tablets remain in school. For tablets to be stolen the thieves are required to break in to the school building and every single class so that they can steal the devices.

Intel Education Tablets

Tablets are students' property. There is always some risk as the students carry their tablets to and from school every day.

HIVE OS

Tablets stay in classrooms. Just as in Google Play for Education, it is required to break in to the school building...

#5 Loss of Device

Google Play for Education

Devices are kept in classrooms all the time.

Intel Education Tablets

Devices are with students. Loss is possible.

HIVE OS

Devices stay in classrooms all the time.

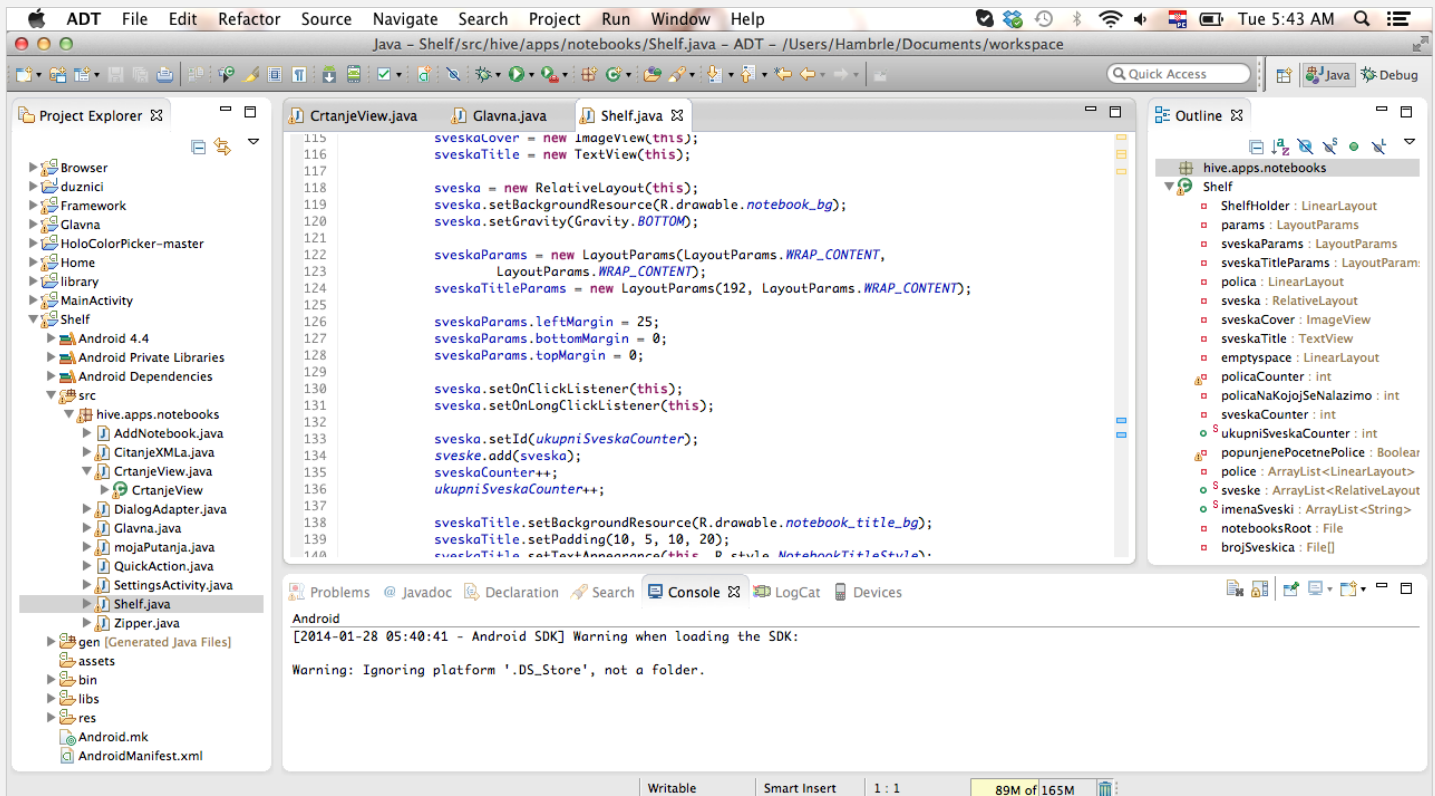
COMPARISON WITH OTHER SOFTWARE

Software Name	HIVE OS	Google Play for Education	Intel Education Tablets
Way of operation	Cloud Based	Cloud Based	Local
Tablet Owner	Institution	Institution	Personal
Apps	Stock	Stock + Play Store	Stock
User Account	ID Card (NFC)	School Google Account	-
Source Code	Open Source	Closed Source	Closed Source

TOOLS, METHODS AND SERVICES USED

Development

As an IDE we had two choices; Eclipse or Android Studio. After giving Android Studio a shot we figured that the directory structure it was using to arrange source files was more complex and untidy than the way Eclipse was. Naturally, our choice was Eclipse.



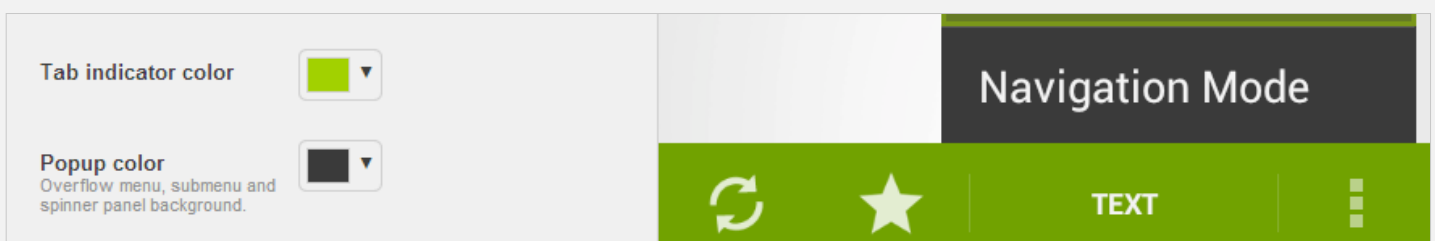
ADT Bundle <http://developer.android.com/sdk/index.html>

UI, Mockup and General Design

Android Asset Studio <http://android-ui-utils.googlecode.com/hg/asset-studio/dist/index.html>

In HIVE apps we chose a rather custom design than the general UI design of most Android apps. We still followed the Android Design Guidelines¹ but instead of using the default themes we created our own ones. We used different colors in different apps. Notebooks is green, Books blue, and Drawings purple. Using custom colors in UI required custom drawables² for UI elements.

Android Asset Studio lets you select colors and styles for various UI elements, packs them up for you with PNG files and style XMLs. All you have to do to use them is to unpack the package in your application directory and define the styles. Thus, saving you a great amount of time you would've otherwise wasted in Photoshop and Draw 9-patch³.



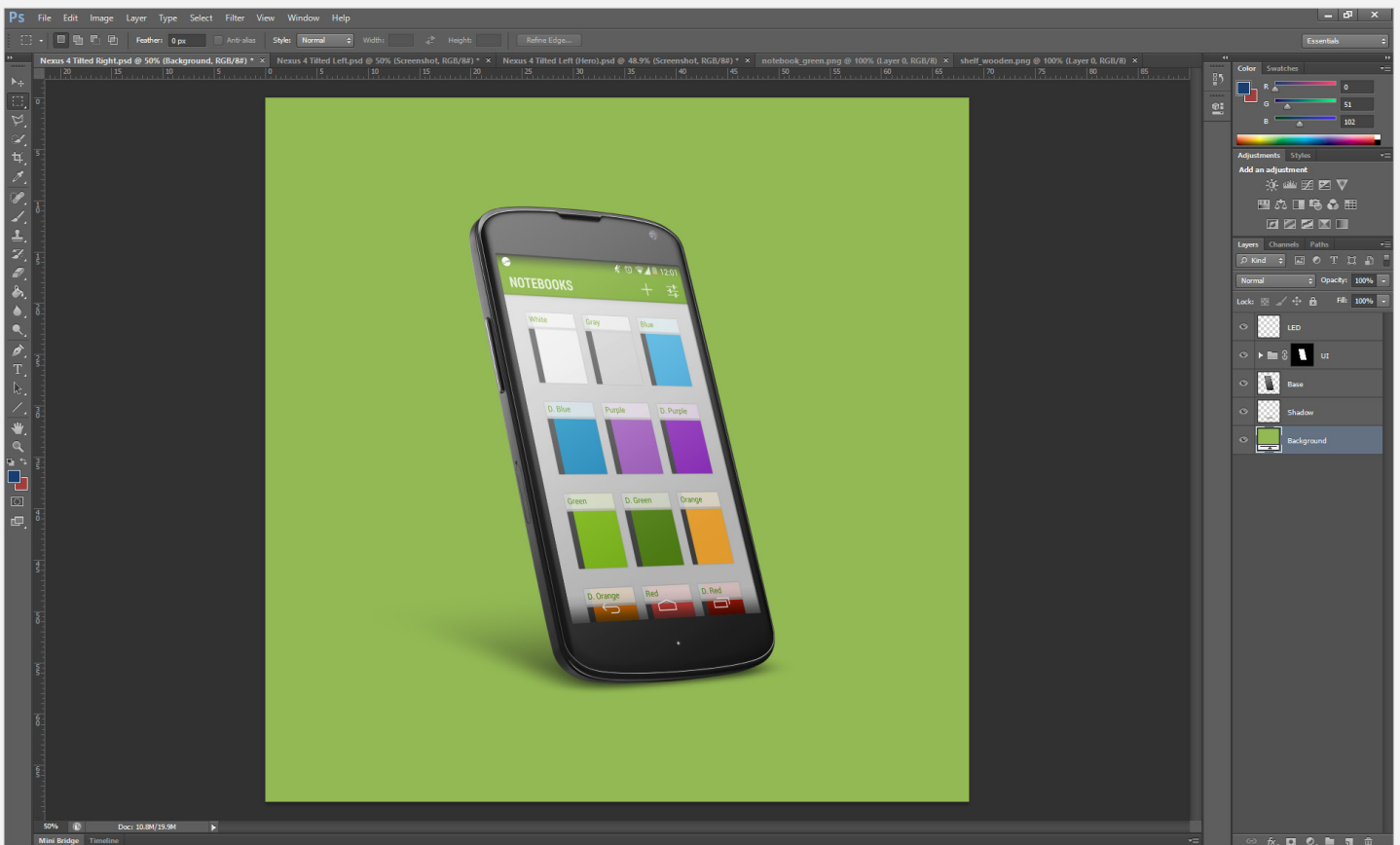
¹ <http://developer.android.com/design/index.html>

² Drawables are png images used in android apps

³ More information about Draw 9-patch can be found in the next page

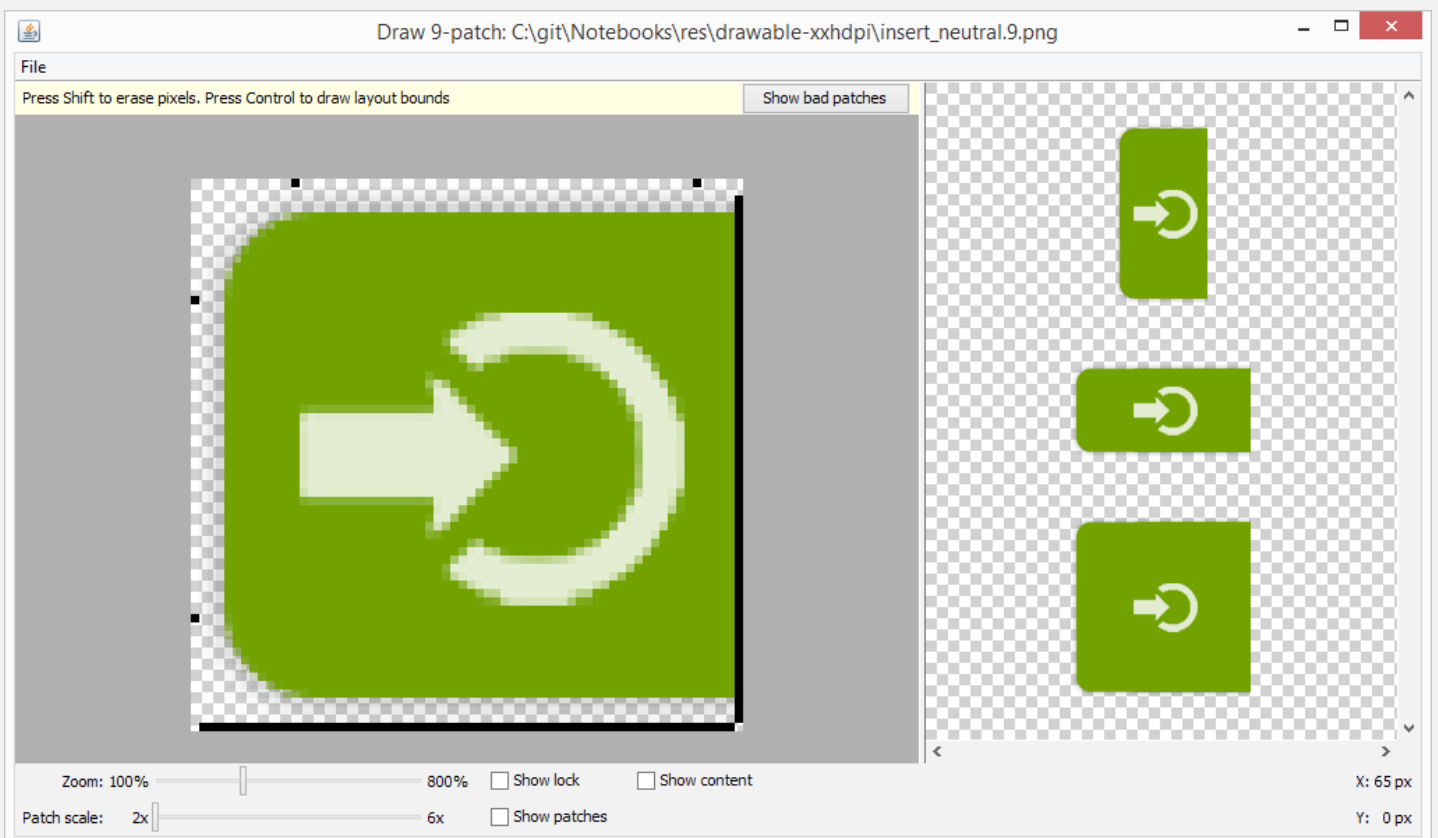
Photoshop <http://www.adobe.com/products/photoshop.html>

Photoshop was used for almost any design related work; UI elements, Mockups, Covers for research paper and journal, Poster, Screenshots, and so on...



Draw 9-patch <http://developer.android.com/tools/help/draw9patch.html>












This tool let's you create nine-patch PNGs. Nine-patch PNGs contain 1px of black indication points or lines that define how an image will be stretched. The screenshot below is a perfect example.



Code Management

As two people working in team we needed a way to work together. A way in which changes done by one person wouldn't mess up the code of the other one. A way in which changes done to the code could be accessed and reverted at a later time... Git was the perfect solution.

Initially, we chose bitbucket as we needed private repositories. As time passed and our code shaped up, the need to keep our repositories private slowly disappeared. Anyone who has used bitbucket has probably noticed that it lacks some features. Especially in the area of statistics. This became our reason to migrate to another service and soon, we found ourselves on github.

Jan 04, 2014		
	Notebook cover layout change and some ui adjustments (May require mar... ... xiprox authored 23 days ago	ee922de8c1 + Browse code ➡
Jan 03, 2014		
	Paging Hambrie authored 24 days ago	43cd9f5281 + Browse code ➡
	Finished paging system, fixed bug Hambrie authored 24 days ago	da29ab3590 + Browse code ➡
	Merged in paging2 (pull request #4) ... xiprox authored 24 days ago	ba210dd5d5 + Browse code ➡
Dec 27, 2013		
	Long planned action bar bg modification and glavna.xml system bar bg xiprox authored a month ago	654dac1ac3 + Browse code ➡
Dec 21, 2013		
	Added page numbers Hambrie authored a month ago	e19d505200 + Browse code ➡
	Loading updated. No more crashes while switching pages. But still not... ... Hambrie authored a month ago	a5a77f2697 + Browse code ➡
	Added option to clean notebook content xiprox authored a month ago	142a8d84e0 + Browse code ➡
	Fixed crash upon notebook deletion xiprox authored a month ago	c1a0716f31 + Browse code ➡
	Automatic creation of page folders xiprox authored a month ago	602ed98054 + Browse code ➡
	Started work on page system Hambrie authored a month ago	566666e862 + Browse code ➡



git
<http://git-scm.com>



Bitbucket
<https://bitbucket.org>



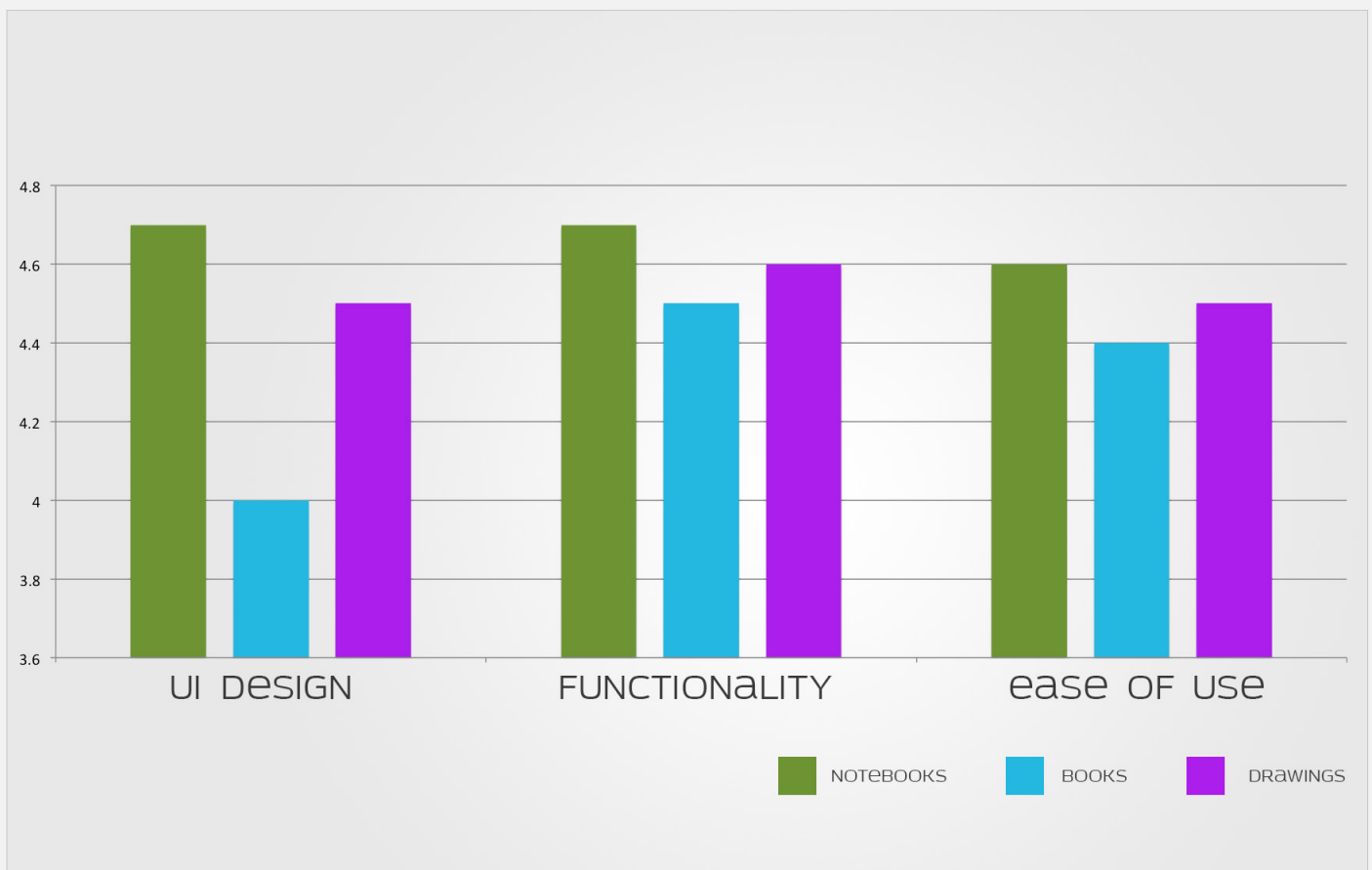
Github
<https://github.com>

BUILDING, TESTING AND RE-BUILDING

At some point of the project we had to build some test versions of our project in order to see how far things have come, whether the apps meet our pre-defined criteria, and to gather feedback from users in order to fix, improve and/or add new features.

Testing and collecting feedback

We distributed *beta* versions of our apps to several people to let them test and give feedback. We had them fill out an online survey based on their experience while testing our apps. The survey can be found at <http://hive-feedback.xiprox.org>.



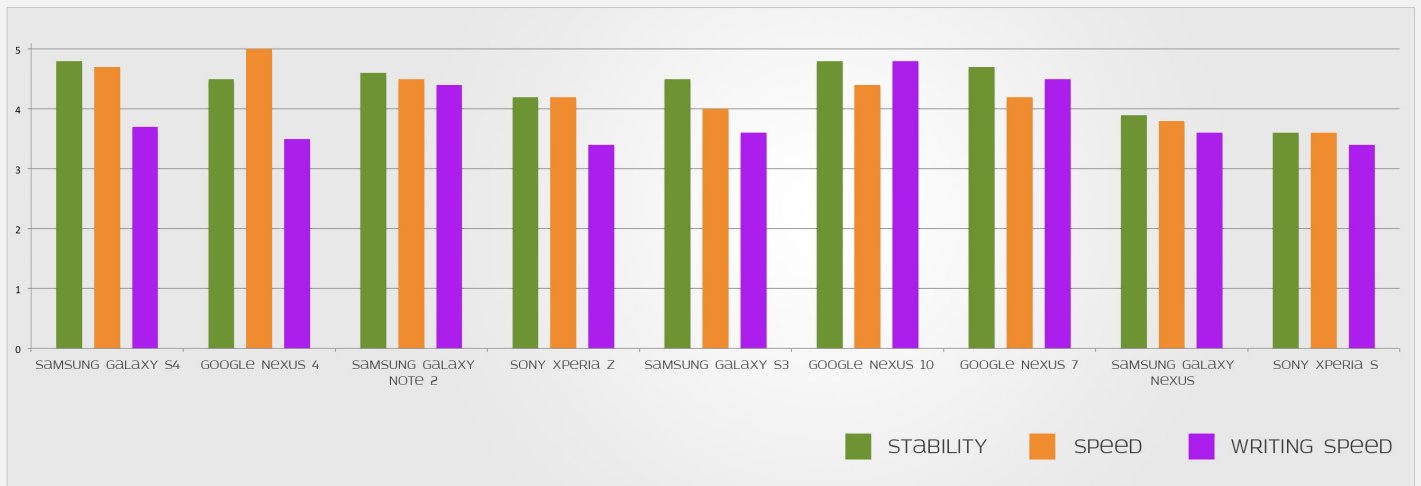
Opinions of our *beta testers* on our apps' design, functionality, and ease of use.

The results came out pretty much as we had guessed. The design of our Books app wasn't really good. And the app wasn't really that easy to use. Surprisingly, Notebooks app got rated the best in functionality. We believed that it lacked some features and that there were ways to improve it. The results for Drawings app we more or less the same as our expectations.



Notebooks

Survey Results



In this chart, you can see how our app behaved and functioned on various devices with different specifications and screen sizes.

Other feedback

Feedback we collected from people around us.

Issues

- Items not centered in add notebook activity.
- Letters such as p, g, j are moved up to fit in the line rather than leaving some part of the letter below the baseline.

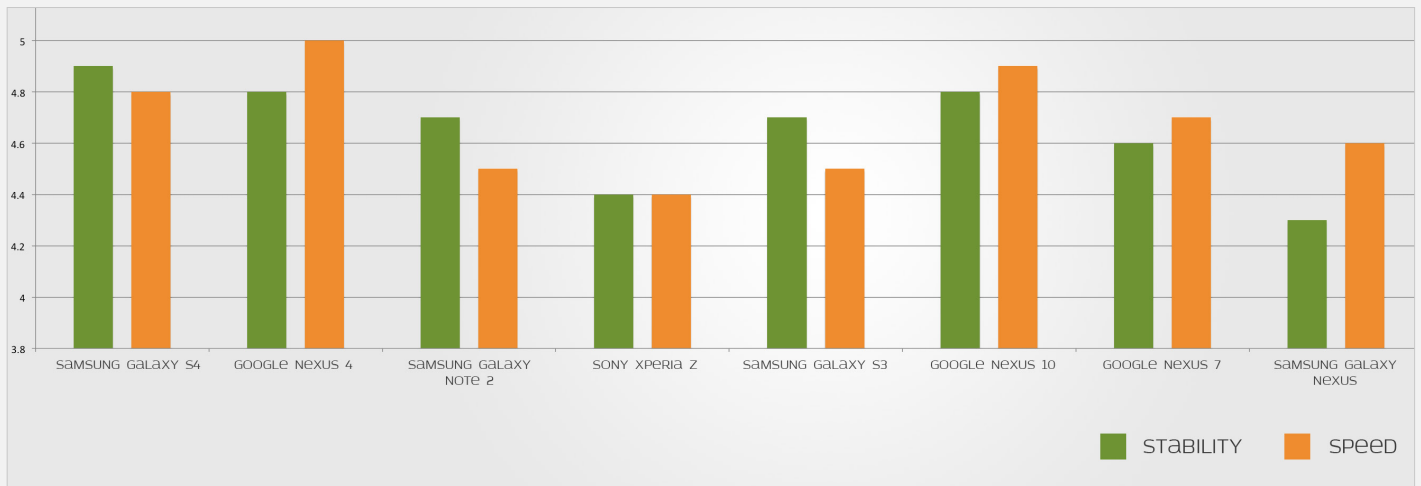
Feature ideas

- Remove insert button and make the app so that the words get inserted automatically.
- Change notebook cover style.
- Drawing mode.
- Change default brush color.



Books

Survey Results



In this chart, you can see how our app behaved and functioned on various devices with different specifications and screen sizes.

Other feedback

Feedback we collected from people around us.

Issues

- Book size in shelf view too small.
- Display books in a row depending on screen size.

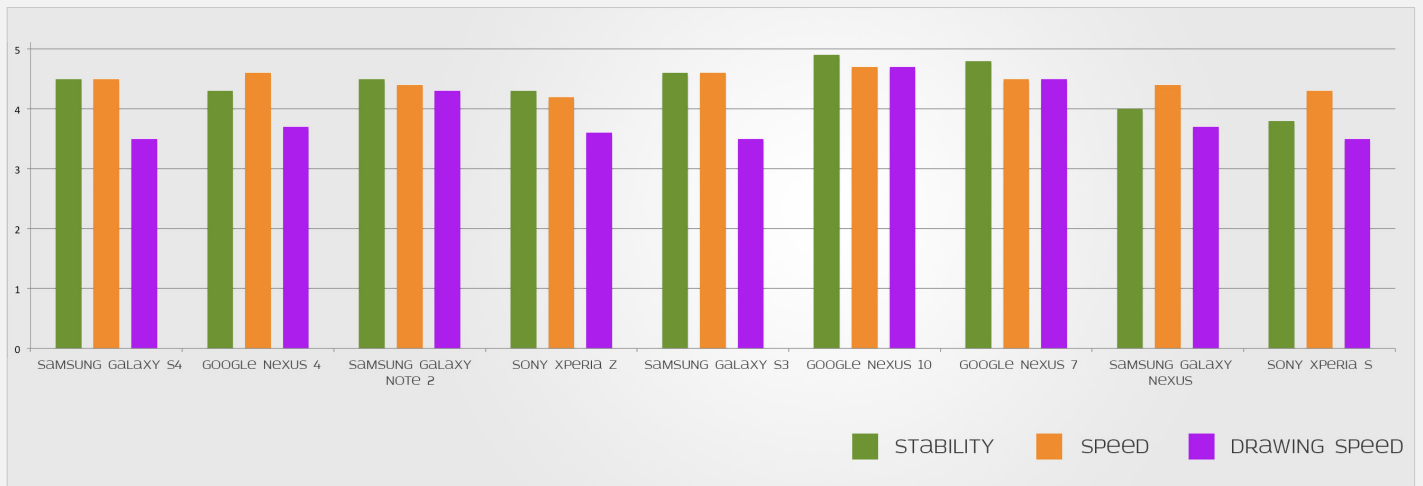
Feature ideas

- Annotation mode is a definite need and should be implemented.
- Better "go to" icon.



Drawings

Survey Results



In this chart, you can see how our app behaved and functioned on various devices with different specifications and screen sizes.

Other feedback

Feedback we collected from people around us.

Issues

- Drawings are way too big in shelf view on phones.

Feature ideas

- Add undo button.
- Change default brush color.

CHANGES MADE TO THE PROJECT BASED ON TEST RESULTS



Notebooks

- **Fix** Items not centered in add notebook activity.
- **Fix** Letters such as p, g, j are moved up to fit in the line rather than leaving some part of the letter below the baseline.
- **Add** Remove insert button and make the app so that the words get inserted automatically.
- **Add** Change notebook cover style.
- **Add** Drawing mode.
- **Add** Change default brush color.



Books

- **Fix** Book size in shelf view too small.
- **Fix** Display books in a row depending on screen size.
- **Add** Annotation mode is a definite need and should be implemented.
- **Add** Better “go to” icon.



Drawings

- **Fix** Drawings are way too big in shelf view on phones.
- **Add** Undo button.
- **Add** Change default brush color.

OPEN-SOURCE AND AVAILABILITY



<https://github.com/hiveos>

All apps and components of the HIVE Project are and will always be open-source no matter how much development the project faces. Anyone can download and build the apps and/or the ROM/OS themselves.

For a school or institution to be able to use the HIVE Operating System, all they have to do is to purchase a supported device and install the rom for the device. Roms can be downloaded from our website. If the institution desires to use a non-nexus device (HIVE Project only supports nexus devices) they'll have to port the ROM to that device. No kind of fees are required for download and use of any HIVE Apps, components and/or ROMs.

Instructions on how to build the ROM can be found at <http://hive.bluedream.info/building>.

ROMs can be downloaded from <http://hive.bluedream.info/roms>.

SPECIAL THANKS TO

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For being our supervisor and one of the team in the meantime.

Amer Zavlan

For being the helping hand when things got stuck.

And all other people who tried our project, gave feedback, shared their ideas or contributed the least bit to the project. Very special thanks to those who participated in our survey.

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