

SysPro: An Android Mobile Application for the Course System Programming

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Abstract: Mobile devices have become attractive learning devices in education sector. The majority of the existing research has focused primarily on the value of mobile learning for students and instructor. Mobile learning offers modern ways to support learning process through mobile devices. SysPro is an android mobile application for the course System Programming of Third Year Computer Science and Engineering. This application contains study material, power point presentations, quiz, question bank and games like crosswords; word search, word scramble and word match for every unit of this course. The APK file for this mobile application is available on the URL-<https://play.google.com/store/apps/details?id=in.witsolapur.sysproapp> while the framework for SysPro is available on the Github URL: <https://github.com/sunitamdol/SysPro> or <https://github.com/psrpatnaik/syspro>.

Keywords: SysPro, System Programming, Android Mobile Application, Crossword Puzzle, Word scramble, Word matching, t-Test

1. Introduction

Mobile phones are very popular among the students due the features like wireless and portable. More and more softwares were developed on mobile devices for use in education sector. We have developed the mobile application 'SysPro' for System Programming of Third Year Computer Science and Engineering. The APK file for this mobile application is available on the URL-<https://play.google.com/store/apps/details?id=in.witsolapur.sysproapp>. Successful integration and future acceptance of mobile technology depends on its usability (Bates, C. C., & Martin, A. 2013). Feedback and Result Analysis show that this mobile application is very useful to the students.

2. Literature Survey

The findings related to the use of mobile in education have been interpreted to determine their implications on the development of mobile learning experiences in teacher education, including programmatic directions for integration and study (Evrin Baran)]. Aubusson, P. Et. Al. (2009) reflects on the role of mobile learning in teachers' professional learning.

Cheon, J. (2012) described the current state of college students' perceptions toward mobile learning in higher education.

Chen, C. (2010) developed a Mobile Assessment Participation System (MAPS) using Personal Digital Assistants (PDAs) as the platform

The authors Mohamed Osman M. El-Hussein and Johannes C. Cronje defined mobile learning as "any type of learning that takes place in learning environments and spaces that take account of the mobility of technology, mobility of learners and mobility of learning".

The paper "Developing and Implementing a Framework of Participatory Simulation for Mobile Learning Using Scaffolding" proposed a conceptual framework, scaffolding participatory simulation for mobile learning (SPSML), used on mobile devices for helping students learn conceptual knowledge in the classroom.

This longitudinal study was set out to establish the preferences regarding downloading apps of undergraduate university students (Andrea Potgieter).

Luiz Fernando Capretz and Muasaad Alrasheedi found that learners perceive collaboration opportunities and anytime anywhere learning possibility as the key benefits of m-Learning.

The study covered in the paper, "A Critical Meta-Analysis of Mobile Learning Research in Higher Education" looks at the conceptual frameworks and theories underpinning mobile learning research studies, the global experiences of using mobile digital devices for learning, and the factors enhancing or hindering the acceptance and use of mobile digital devices for learning in higher education.

In different subject areas in mobile learning, issues like students' academic achievements, attitudes and perceptions of influence, teacher/teaching staff attitudes or perceptions, adaptable mobile environments, cooperative mobile environments, mobile environments self-regulated learning, mobile environments of information presented in different ways the effects of game-based mobile learning, note-taking with mobile tools, mobile applications in formal education, and mobile augmented reality environments become prominent (Özgen Korkmaz).

3. SysPro Content

The diagram for SysPro mobile application content is shown in Fig. 1. System Programming subject contains six chapters namely Language Processor, Assembler, Macro and Macro Preprocessor, Compilers and Interpreters, Linker and Loader

For each chapter, Notes, Power Point Presentations, Quiz, Question Bank and Games like Word Scramble, Cross Word and Word Match are provided.

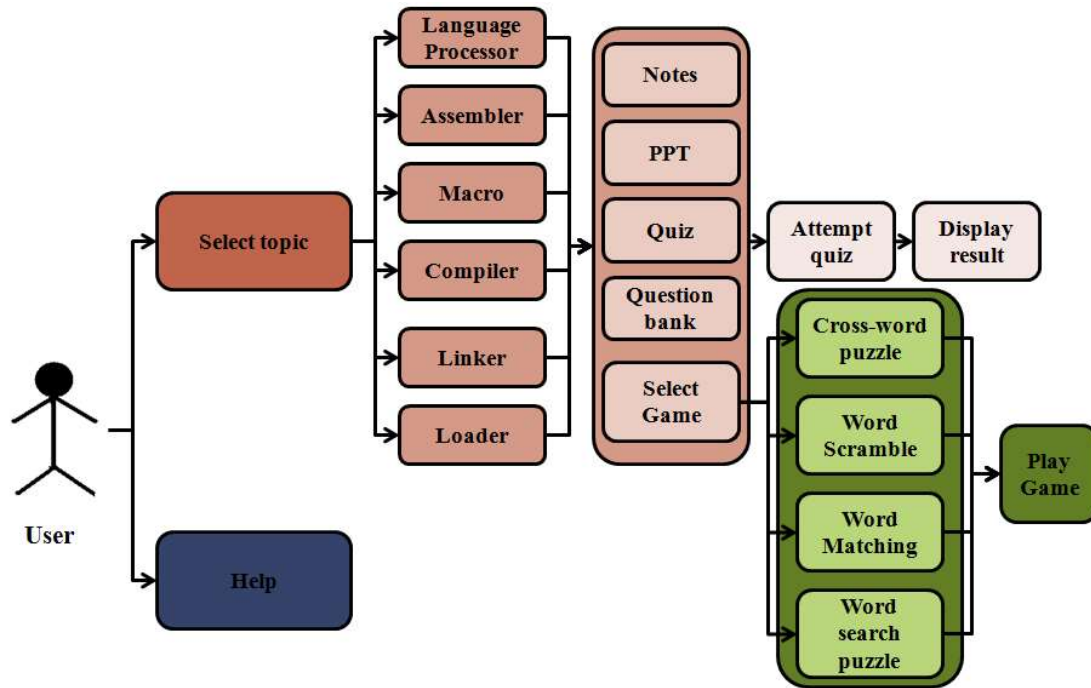


Fig. 1. SysPro Application Content

A.SysPro Content

Download the application from the site <https://play.google.com/store/apps/details?id=in.witsolapur.sysproapp>. After installing this application in the mobile, following icon will be displayed in the mobile.



Fig. 2: Application Icon

After displaying the icon, following screen shown in the Fig. 2 will be there for 10 seconds.

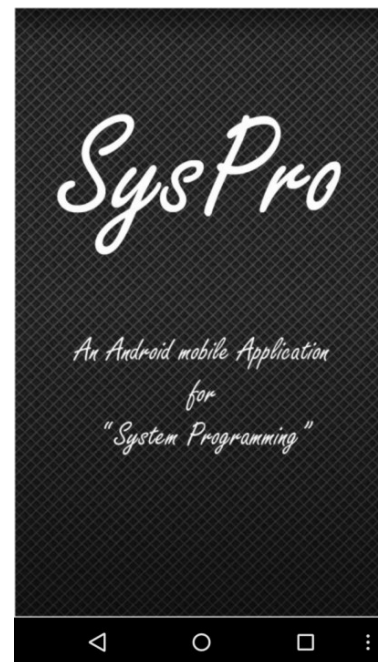


Fig. 2: Screen for 10 second

After the above screen, main screen will appear which contains the name of units of System Programming as shown in the following Fig. 3:

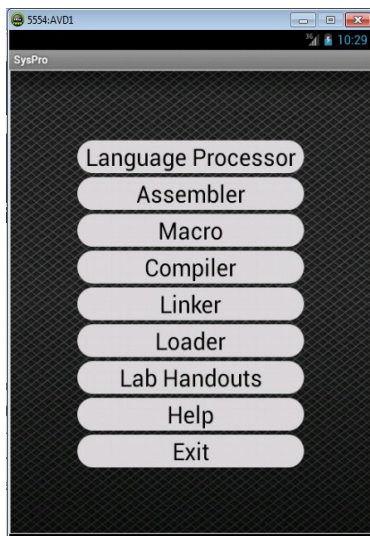


Fig. 3: main screen of the application

If any of the button like Language Processor or Assembler or Macro or Compilers or Linkers or Loader, following screen will be displayed shown in Fig. 4.



Fig. 4: Content for each unit of System Programming course

1. Study Material

Study material i.e. notes for each unit of this course is provided in this application which is shown in Fig. 5.

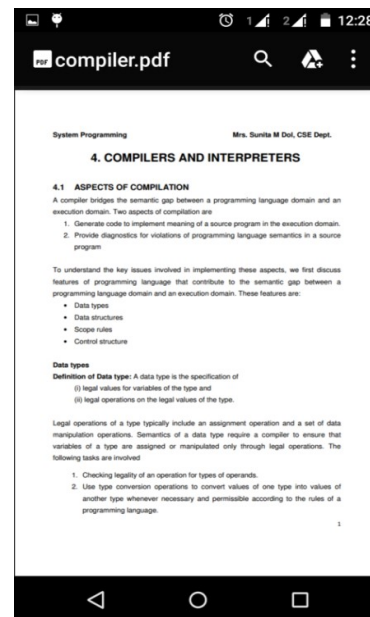


Fig. 5: Study material

2. Power Point Presentations

Power point presentation for every unit of this course is available in this application. Once you click on the power point presentation of particular unit of this course then that power point presentation get saved in your mobile.

3. Quiz

This mobile application contains the quiz for every unit of this course. Students can attempt the quiz and after clicking on the option of particular question, the answer is displayed at the bottom. Students cannot go back to attempt the previous question. Once the answer is selected then students cannot reattempt that question. After clicking the finish button, it will give you the number of question attempted, number of wrong questions and total score. The quiz screen is shown in Fig. 6.

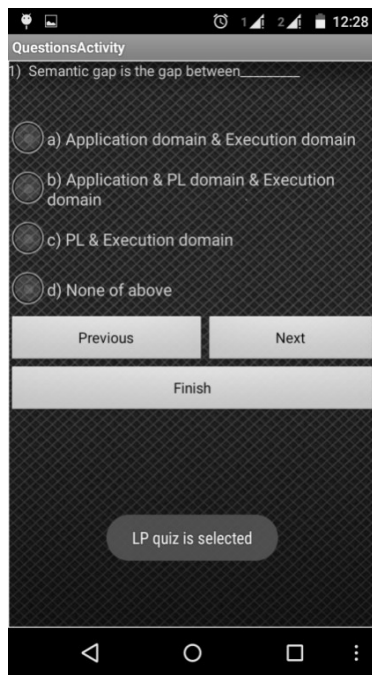


Fig. 6: Quiz

4. Question Bank

This application contains the subjective question bank for every unit of System Programming. This question bank will be helpful for the students at the time of examination, which is shown in Fig. 7.

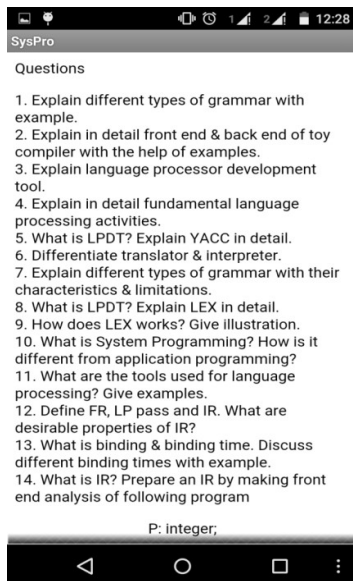


Fig. 7: Subjective question bank

- Crossword puzzle
- Word matching

i. Word Scramble

It is a word puzzle with a set of words, each of which is “jumbled” by scrambling its letters. A solver reconstructs the words, and then arranges letters at marked positions in the words to spell the answer. It makes subject learning more enjoyable and interesting. Using this game, students try to memorize the word which they learned during this subject. The SysPro app contains the word scramble puzzle for each unit of System Programming, out of which the word scramble for one unit, Assembler, is shown in the following Fig. 8.

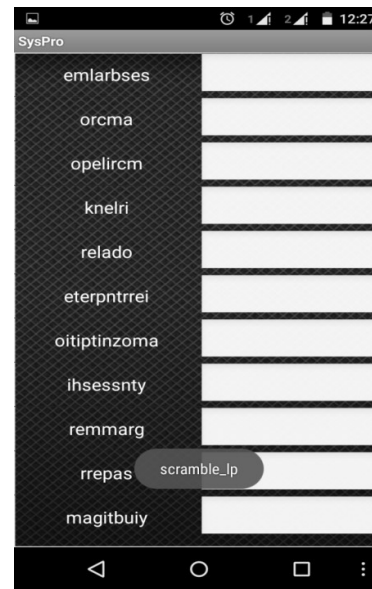


Fig. 8: Word scramble example

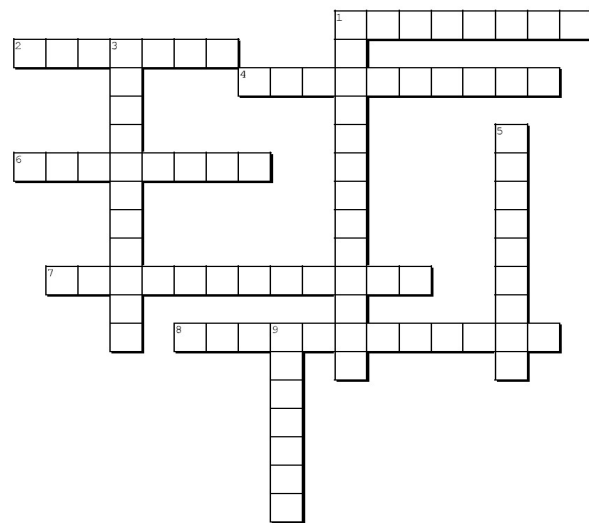
ii. Cross Word Puzzle

A crossword is a word puzzle whose goal is to fill the squares with letters of the words, by solving clues which lead to the answers. It increases vocabulary and enhances problem-solving skills. It improves the speed of thinking and talking. The sample example is given in the following Fig. 9.

5. Games

This mobile application contains the following games for every chapter:

- Word search



Across

1. the ---- gap is between the application and execution domains
2. ---- rules which govern the formation of valid lexical units in the source language
4. A program ---- activity aims at automatic generation of a program
6. A language ---- bridges the specification gap between two PLs
7. A ---- bridges the same execution gap as the language translator, but in the reverse direction
8. A ---- is a language processor which bridges an execution gap but is not a language translator

Down

1. ---- gap is the semantic gap between two specifications of the same task
3. An ---- is a language processor which bridges an execution gap without generating a machine language program
5. A program ---- activity organizes the execution of a program written in a PL on a computer system
9. ---- processes the string of tokens built by lexical analysis to determine the statement class

Fig. 9: Crossword puzzle example

The SysPro app contains the cross word puzzle for each unit of System Programming. After clicking on show button as shown in Fig. 10, the app will display the clues, find answer of the clues and enter the letter of answers in the respective box.

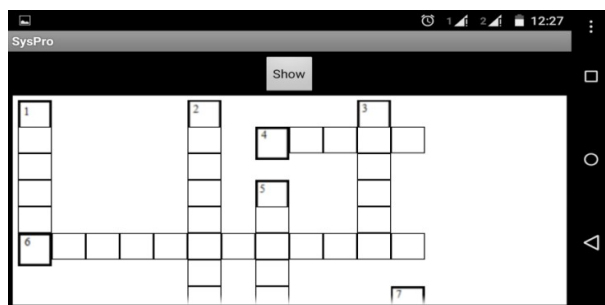


Fig. 10: Crossword puzzle example screen

iii. Word Match

The Word Match puzzle is a puzzle where the user has to match a word (or phrase) to its corresponding phrase. The sample example of this puzzle is given below in the Fig..

1.	a	language translator	a. bridges an execution gap to the machine language
2.	f	detranslator	b. The execution gap is bridged by-----
3.	d	preprocessor	c. The specification gap is bridged by-----
4.	h	language migrator	d. bridges an execution gap but is not a language translator
5.	i	specification gap	e. bridges an execution gap without generating a machine language program
6.	g	execution gap	f. bridges the same execution gap as the language translator, but in the reverse direction
7.	c	software development team	g. The gap between the PL and execution domains
8.	b	designer of the programming language processor	h. bridges the specification gap between two PLs
9.	e	interpreter	i. The gap between the application and PL do-mains
10.	j	semantic gap	j. The gap between the application and execution domains

Fig. 11: Word match example

Like other puzzles, the SysPro app contains the word match puzzle for each unit of System Programming.

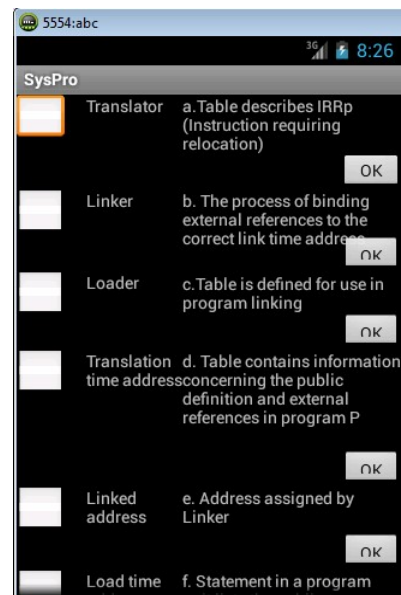


Fig. 12: Word match example screen

B. Feedback and Result Analysis

University result of 2014 Shift-II batch for which this mobile application was given is compared with university result of 2014 Shift-I batch for which no such application was provided. The graph which is shown in Fig. 13. Fig. shows the significant improvement in students'

performance of 2014 Shift-II batch as compared to 2014 Shift-I batch.

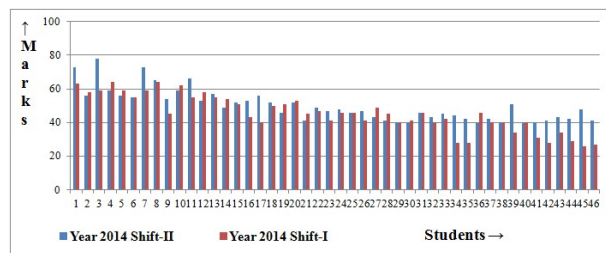


Fig. 13: Performance of Students in university examination in System Programming course (Year 2014 Shift-II and Shift-I)

Statistical analysis using t-Test was calculated to test if two groups differed significantly from each other. For t-test to be significant statically, t must be at least 2.145 and $p \leq 0.05$. t-Test result also shows statistical significant difference between students' performance of 2014 Shift-II batch as compared to 2014 Shift-I batch which is shown in Table 1.

Table 1 : Statistical Analysis using t-Test for university result examination (Year 2014 Shift-II and Shift-I)

Degree of Freedom	Standard Deviation	t value	p value
90	10.2	2.0	0.048

Similarly University result of 2015 Shift-II batch for which this mobile application was given is compared with university result of 2015 Shift-I batch for which no such application was provided. In this Fig. also, there is

significant improvement in students' performance of 2015 Shift-II batch as compared to 2015 Shift-I batch.

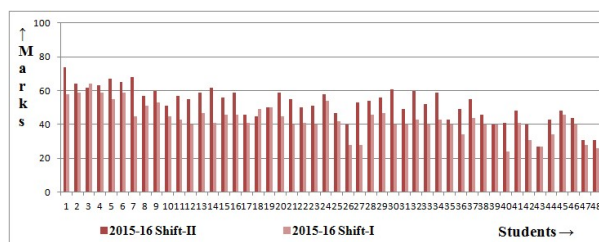


Fig. 14: Performance of Students in university examination in System Programming course (Year 2015 Shift-II and Shift-I)

Similarly t-Test result also shows statistical significant difference between students' performance of 2014 Shift-II batch as compared to 2014 Shift-I batch which is shown in Table 2.

Table 2 : Statistical Analysis using t-Test for university result examination (Year 2015 Shift-II and Shift-I)

Degree of Freedom	Standard Deviation	t value	p value
94	9.60	4.75	<0.0001

Table 3 shows the feedback about the SysPro mobile application. It is found that 100% students liked this application.

Table 3 : Feedback Form

Sr. No.		Strongly agree	Agree	Neutral	Disagree	Strongly disagree
1	Whether SysPro covers the syllabus of System Programming?	60%	40%	-	-	-
2	Whether study material given in the app is useful?	43%	53%	4%	-	-
3	Whether power point presentation given in the app is useful?	46%	46%	8%	-	-
4	Whether quiz provided in the app is useful?	57%	23%	-	-	-
5	Whether games provided in the app is useful?	40%	50%	10%	-	-
6	Whether question bank given in the app is useful?	53%	25%	2%	-	-
7	Whether the lab handouts provided is useful?	50%	49%	1%	-	-
8	Whether this app clarifies the concepts of System Programming?	45%	46%	9%	-	-
9	Did you like this mobile app?	Yes= 100%				

3. Conclusions and Future Work

In this paper, we considered the mobile application 'SysPro' developed for System Programming of Third Year Computer Science and Engineering. The framework is available on the Github URL: <https://github.com/sunitamdol/SysPro> or <https://github.com/psrpatnaik/syspro>. The APK file for this mobile application is available on the URL- <https://play.google.com/store/apps/details?id=in.witsolapur.sysproapp>. It is found that this tool is useful for students and 100% students agreed that they liked this tool.

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