BAHÇEŞEHİR UNIVERSITY
FACULTY OF ENGINEERING

DEPARTMENT OF COMPUTER ENGINEERING

EXAM REPORTING AND EVALUATION SYSTEM

Submitted by
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İSTANBUL, JUNE 2012

BAHÇEŞEHİR UNIVERSITY
FACULTY OF ENGINEERING
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This project work submitted by Ekrem Kocadere has been done under my supervision. I hereby state that the work outlined in this report satisfies the requirements of the compulsory "Capstone Project II" course, and Ekrem Kocadere can take the capstone project examination.

Signature and Date
…….
OKAN ŞAKAR

Ekrem Kocadere has taken and passed the capstone project examination in our presence on June ……., 2012. We hereby certify that this project work fulfills all requirements of "Capstone Project II" course.

THE EXAMINATION COMMITTEE

Committee Member Signature

1. ……..
   ……..
2. ……..
   ……..
3. ……..
   ……..

I have reviewed this capstone project report submitted by Ekrem Kocadere I hereby endorse the project work described here as a "Capstone Project II."

Signature and Date
…….
Assoc. Prof. Dr. Taşkın Koçak
Chairman of the Dept. of Computer Engineering

SUMMARY

My project is developing an exam reporting and evaluation system. System can be used by instructors to become aware of student success in different topics of lesson. Instructors can understand which topics of lesson are learnt well and which topics are not learnt by students. System takes some data as input and then creates reports and graphs an output. Data must be provided by instructors and system has a database tables to store these data. System has graphical interfaces to input data so users can enter data rapidly. After that system created some statistics about solving ratio of exam questions. I prefer to develop my project with Qt framework on Ubuntu operating system as a development environment because of its huge sources and support.

ÖZET

Benim projem sınav raporlama ve değerlendirme sistemi geliştirilmesidir. Sistem öğretmenler tarafından öğrenciler dersin farklı konularında gösterdikleri başarıyı gözlemek için kullanılabilir. Öğretmenler hangi konuların öğrenciler tarafından öğrenildiğini ve hangilerinin öğrenilmediğini anlayabilirler. Sistem girdi olarak bazı veriler alır ve çıktı olarak raporlar ve çizelgeler verir. Veriler öğretmen tarafından sağlanmalıdır ve sistem bu verileri saklamak için veritabanı tablolarına sahiptir. Sistemin grafiksel kullanıcı arayüzü sayesinde kullanıcılar verileri hızlıca girebilir. Daha sonra sistem sınav sorularının çözüm oranları ile alakalı bazı istatistikler oluşturur. Projemi sahip oldukları bolca kaynak ve destek nedeniyle Ubuntu işletim sistemi üzerinde ve Qt çalışma alanını kullanarak yapmayı tercih ettim.

ACKNOWLEDGEMENTS

I want to thank my Programming Project advisor Okan Şakar on helping and guiding me on my project and every single person who helped me on qt and c++ forums. In addition authors and contributors of Ubuntu, Qt, GCC, LibreOffice, Dia and Gnome-screenshot which applications I used to make this thesis and capstone project. Also I want to thank to my family and friends who gave me moral support on my thesis.

Ekrem Kocadere

İstanbul, June 2012

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1. Introduction

Aim of this project is to help instructors to evaluate exam success of students. So instructors can have different aspect about exam results and knowledge level of students about topics. I created a database which can store all data in the first phase. Then I designed a reporting system which creates report and statistics using data in database. Application which I developed takes lesson, student, exam and result information from user as an input. And gives solving ratio of questions of exam and statistics about student success in whole exam and each question.

After this introduction part my thesis report consist of 4 parts. These are section 2 titled “Project Description”, describes what is the project and what it capable to, section 3 titled “Project Purpose”, describes purposes of the project, section 4 titled “Project Development”, describes technologies which I used for developing, entering information and creating reports, section 5 titled “Project Properties”, describes how to add data and receive reports and section 6 titled “Running Project”, describes how application are compiled and ran.

2. Project Description

My project is an exam reporting and evaluating system. System was designed to assist instructors. Therefore user should enter some data to application because application needs these to work. These are lesson, exam, student and result data. Interpreting this information system creates some reports and statistics about students success in questions of exam. These results show solving ratio of question and whether the students understand the subject or not.

Application has database tables to store data and database was designed lesson oriented. So after user adds lesson firstly, he/she can add students and exams at choice for this lesson. If user adds another lesson student, exam and result information, which add formerly, are unavailable for this new lesson. After exam results were added, user can reach reports by clicking report button in menu. Application creates statistics by using data, which user enters. With the result that instructors can analyze exam results and student success for each question more efficiently.

User can reach students list, exams list, points for each question, total exam point and reports by clicking buttons in data entry menu.

3. Project Purpose

Exam results are only information instructors have about understanding students success in lesson. They evaluate students by looking total score of exams and they do not pay attention score for each questions. They think that if a student can get more than average point from exam, he/she learns lesson well. But actually it is not true. Aim of my project is to help instructors about evaluate and measure students success more efficiently. System analyzes exam results on the basis of questions and shows which question solved by students by analyzing taken points for each question. Thus instructors can see topics of lesson which are not understood and can try to be understood better. This policy can conduce to increase success in lessons.

4. Project Development

This project was coded by using C++ programming language and SQL database managing language in Qt framework by using Ubuntu Linux operating system. Graphical interface was designed by using Qt Designer and SQLite was used as a database management system. Different classes were identified for every single interface. Nine database tables were created to store data which user enters. This data were saved in a file which has db file extension in directory where executable file of project is. If there is no db file, application will created it. Application can read only this file. If user changes file name of address application can not read data.

4.1. Development Environment

4.1.1. Framework

I developed this application by using Qt framework. Qt is free of charge, open source and cross platform framework. It was began to develop in 1992 by Trolltech and in 2008 was acquired by Nokia. It has various elements to ease developing applications and thanks to them developers can develop applications

without using any of external tools or libraries. Qt uses C++ by default but it allows to develop console applications or GUI applications by using C#, Python or PHP. Qt was used in many famous software projects. Some of them are KDE desktop environment, VLC multimedia player, VirtualBox virtualization software and Mathematica computational software. And it was used by European Space Agency, DreamWorks, Google, HP, Panasonic, Philips and Samsung. Because of its widely use, it was recognized standard for developing GUI applications. I used tools and libraries which provide only Qt framework in this project.

4.2. Database

4.2.1. Database Management System

Qt supports various database management systems. These are IBM DB2, Borland InterBase, MySQL, Oracle Call Interface Driver, Open Database Connectivity (ODBC) - Microsoft SQL Server and other ODBC-compliant databases, PostgreSQL and SQLite. I prefer SQLite relational database management system because SQLite is the in-process database system with the best test coverage and support on all platforms. Also it is open source and was developed by using C programming language, it implements most of the SQL standards. It is used some big software projects like Adobe Systems, Skype, Mozilla Firefox, Mozilla Thunderbird and Google Chrome. Also it is used widely in embedded systems and mobile operation systems like iOS, Symbian OS, Maemo, Android, Blackberry, MeeGo and webOS because of its small size.

4.2.2. Database Tables

System has nine database tables to store data which provided by user. You can see name and attributes of database tables in image 1. OGRENCI table stores data about students. These are id and name of students. DERS table stores data about lessons. These are period, year and name of lessons. SINAV table stores data about exams. These are name, questions number and total point of exam. SORU table stores data about exam questions. These are number and point of question and name of topic. KONU table stores exam topics. DERSOGRENCI table stores connection between students and lessons. DERSSINAV table stores

connection between exams and lessons. SINAVOGRENCI table stores connection between exams and students. SORU table stores points and topics of every questions in exams. I wrote a class to see database table during user is using application. User can reach database tables by clicking database button which is on mainwindow.

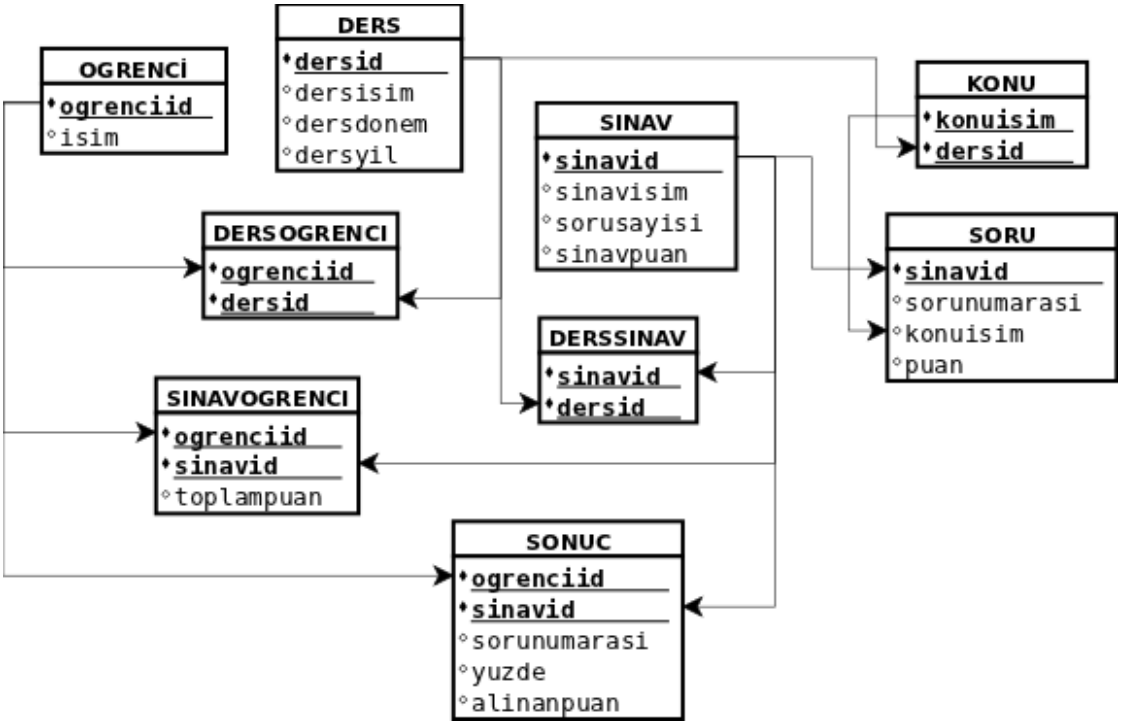


Image 1: database tables

5. Project Properties

5.1. Input Data

Data entry is the most important part of the system. Because in order to give some reports, project should be inputted with some initial data by the user. These are lesson, student, exam and result data. User must enter data in sequence. Lesson must be entered first. Because lesson table is in basic position for database design. After entering lesson, user can enter student and exam data by using menu. Topic data is entered when exam information is being entered. Also result data must be enter lastly.

5.1.1. Lesson

Lesson data must be entered first in order to store all other data. User can enter lesson data by clicking “add lesson” button in main window. After new window appears user enters lesson id and name. Lesson has been added by clicking OK. User can not add lessons with same ID. Lessons is listed in main screen and transactions related to lessons are done by double clicking. User can filter lessons according to years and periods. Hence user select criterion for year and period by using comboboxes on the top of the main window.

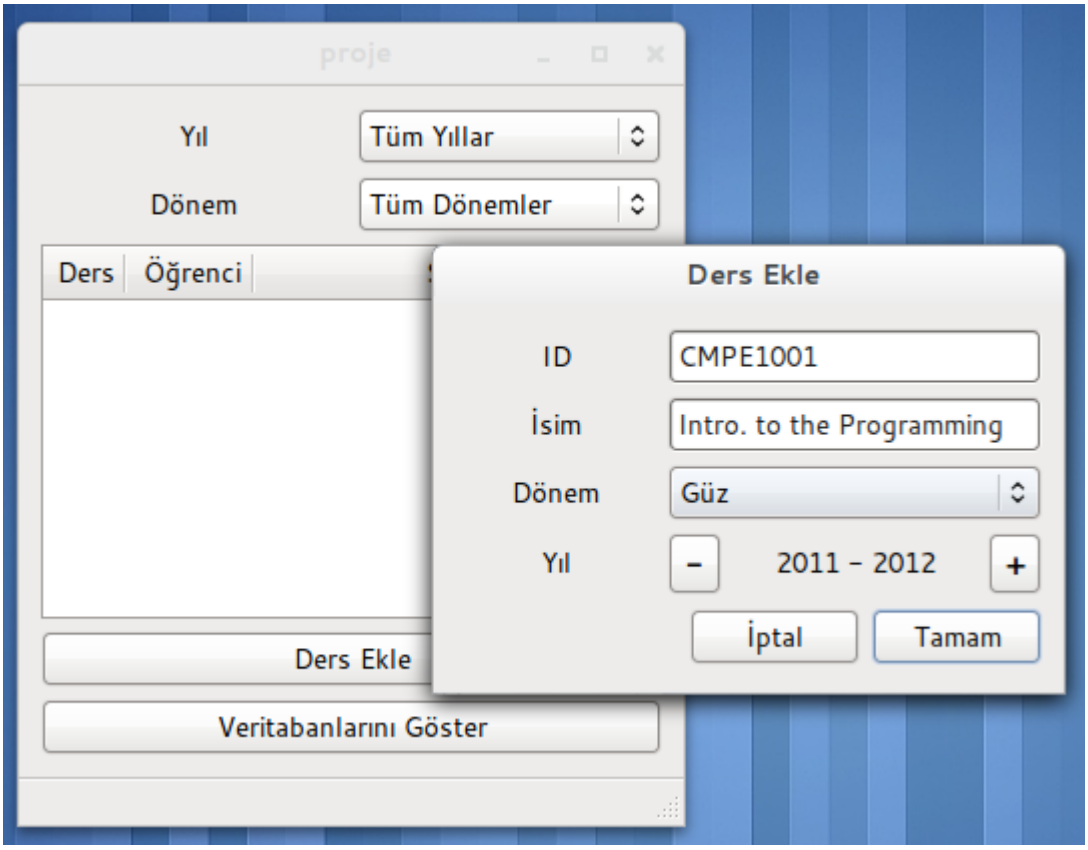


Image 2: adding lesson

5.1.2. Data Entry Menu

After entering lesson user can reach data entry menu by double clicking on lesson name. User can add and update all data by using data entry menu. User can see students list and exams list for selected lesson. Also reports are reached by using this menu.

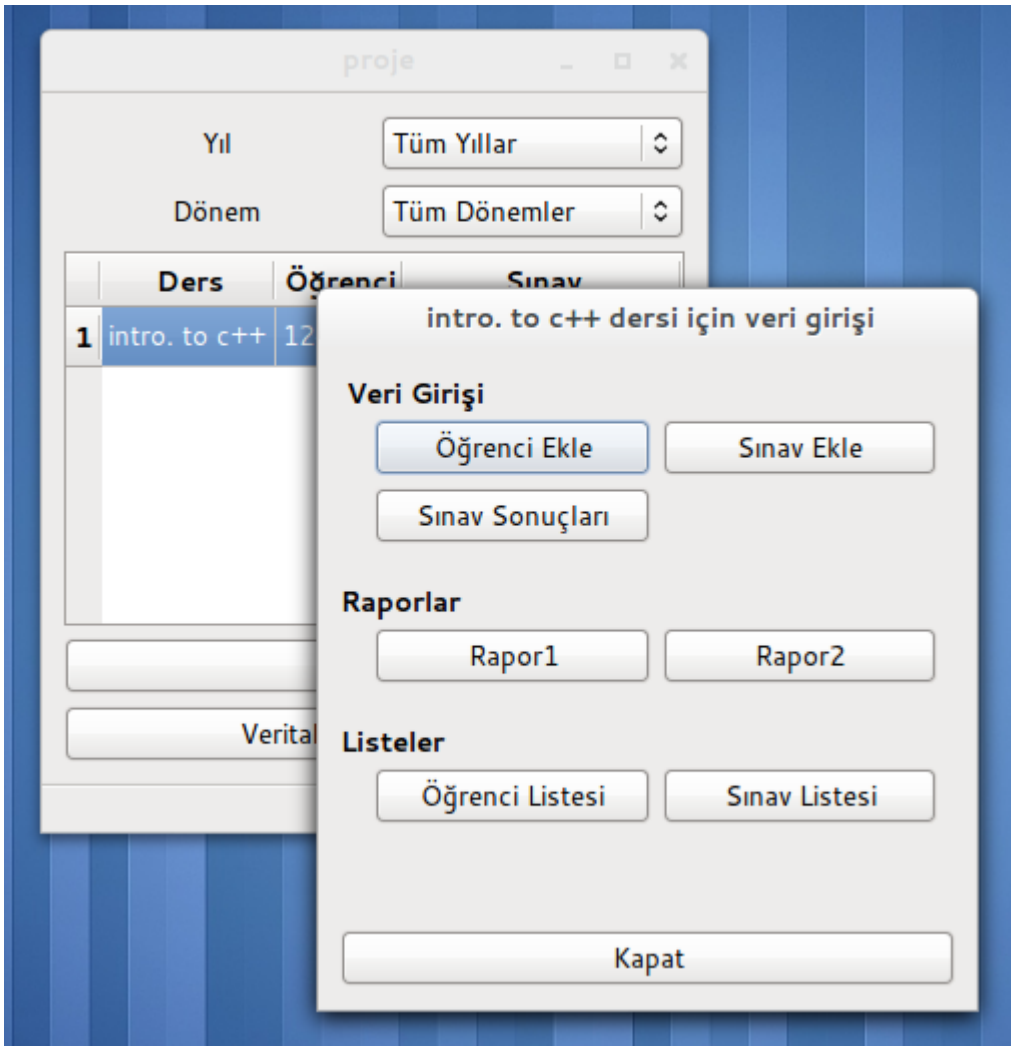


Image 3: data entry menu

5.1.3. Exam

Add exam button is clicked in data entry menu in order to add exams. After new window appears user enters exam name and question number and clicks add topics button. So rows as number of questions is created in list. User must write topic name and point of questions in list. After user clicks OK, exam, topics and points of topics have been added to the database.

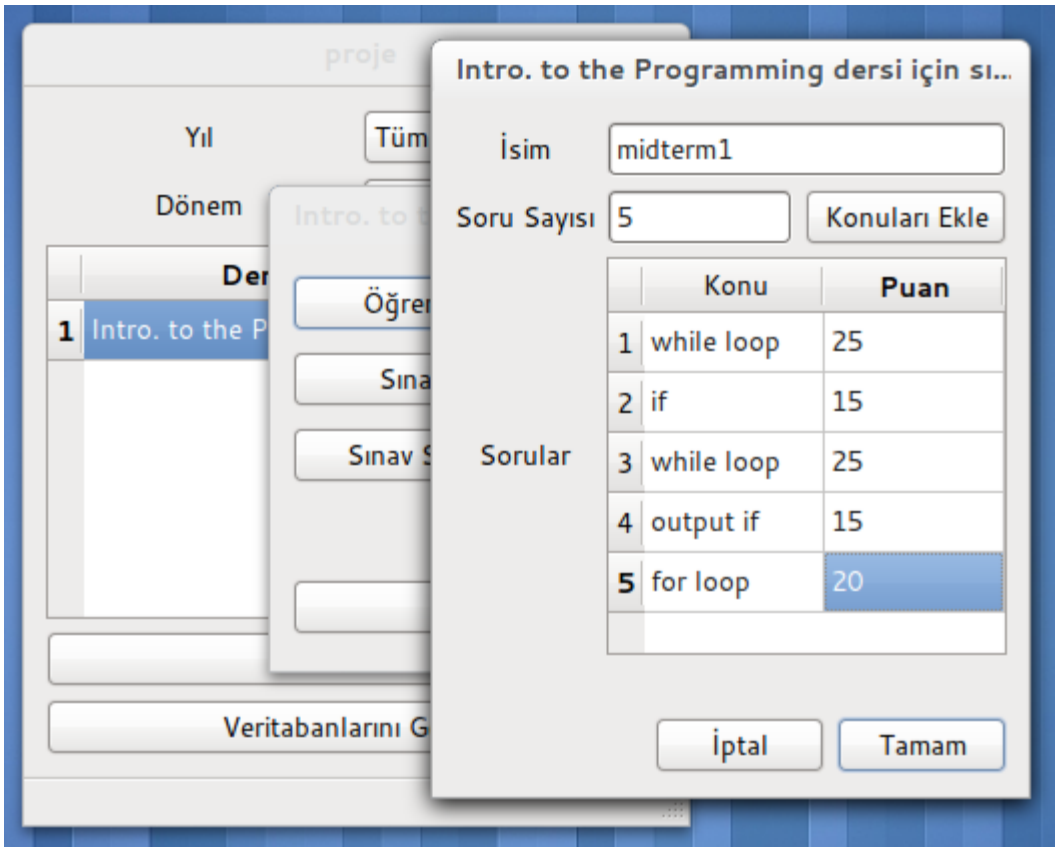


Image 4: adding exam, topics and points

5.1.4. Student

Add student button is clicked in data entry menu in order to add students. After new window appears user enters student name and id. If user may not enter name of students if he/she wants but id of students must be entered and id of students should be unique. When user clicks OK, student has been added to the database. Students are added for only selected lesson. If user wants to add a student for multiple lessons, he/she should do same process of adding student for other lessons.

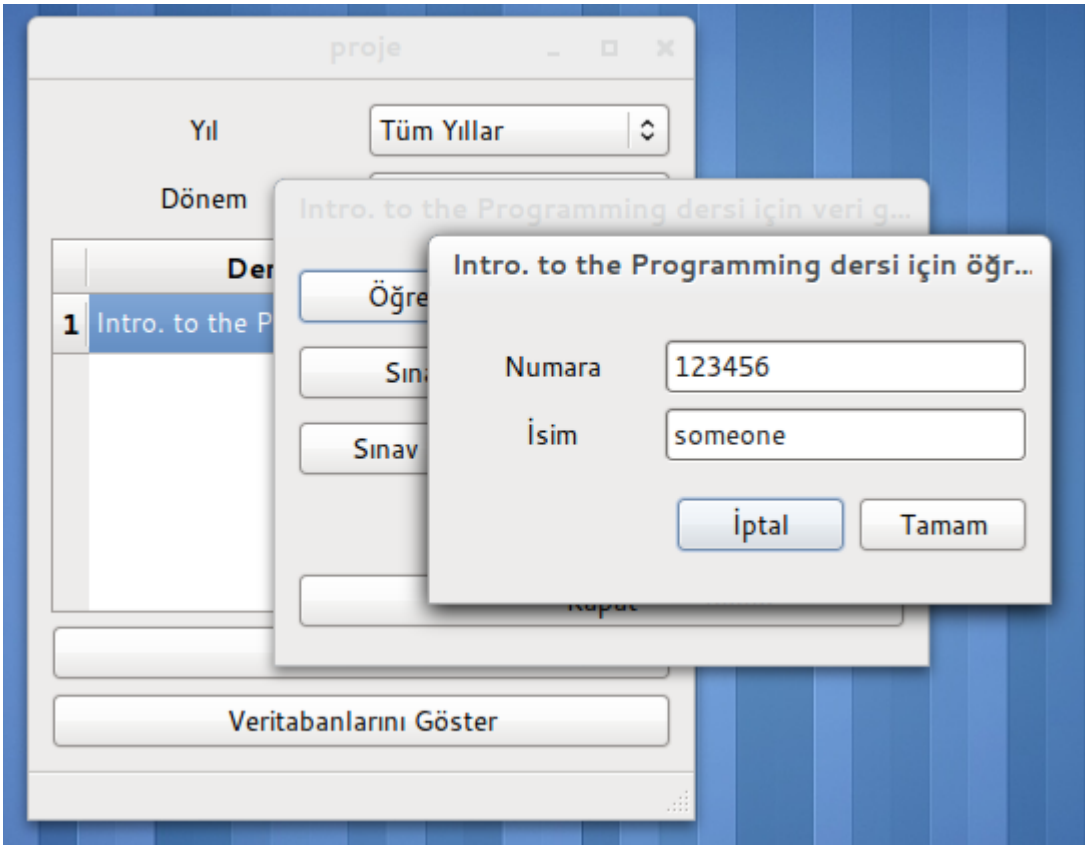


Image 5: adding student

5.1.5. Results

Student and exam data must be added in order to add results of exams. Results must be added to receive reports Add result button is clicked in data entry menu in order to add results. In left top corner of add result window exams of selected lesson are listed. After choosing exam results are entered for every questions. Total point is occurred as long as user entering results. If user do not enter result for all questions for a student, student is considered as a nonattender and nonattenders are not seen in reports. Also user can update results in this window.

Öğrenci\Soru	1 (25)	2 (15)	3 (25)	4 (15)	5 (20)	Toplam (100)
1	9	9	21	10	6	55
2	0	3	0	5	4	12
3	6	4	0	5	3	18
4	17	9	1	10	4	41
5	18	15	25	10	20	88
6	25	14	20	10	9	78
7	1	3	0	0	1	5
8	13	13	22	10	12	70
9	14	11	15	15	4	59

Image 6: adding results

5.2. Reporting

Application creates statistics and reports related to results of questions in reporting part. These reports help to instructors can see the parts of the lesson which are not understood, on the basis of subject and can work to be understood better. Reports can be accessed by clicking report button in data entry menu. Application has three reporting option.

5.2.1. Report 1

User decided seperated criteria for total point of exam and point of each

questions which user wants in this reporting option. After clicking report button system scans database tables for valid entries. Results are listed in tablewidget in same window. You can see an example report in image 7. Report shows us students which gain more than 25 points from exam and 5 points from each questions. You can see id of students, scores for each questions and total score in tablewidget. Also you can see number of students who meet criteria. According to this, 48 percent of all students obtained more than 25 points from exam. From first question 52 percent of all students, from second question 66 percent of all students, from third question 31 percent of all students, from fourth question 61 percent of all students and from fifth question 26 percent of all students obtained more than 5 points. Finally 15 percent of all students met all criteria. Also there are various criteria options. For example you can use less than, equal and not equal instead of more than.

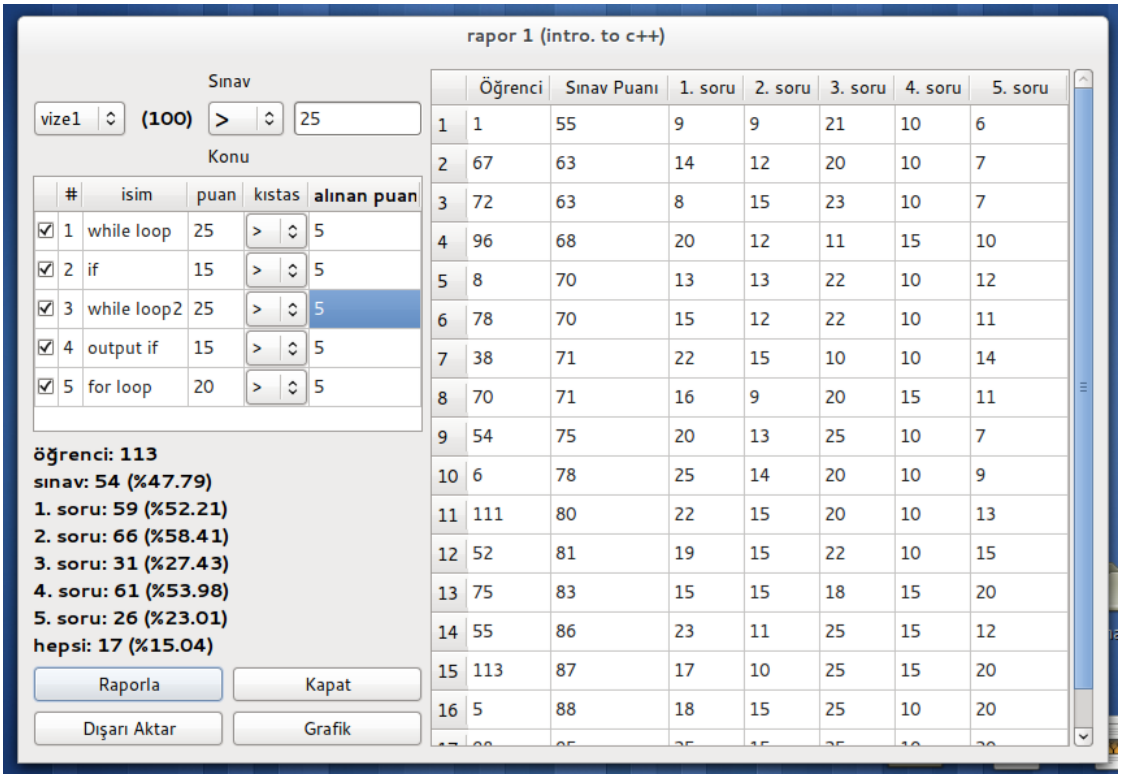


Image 7: first report, you can see students which gain more than 25 points from exam and 5 points from each questions

5.2.2. Report 2

System divides all students into four success criteria for each questions and gives percentage of students in second option. Criteria are 0-25, 26-50, 51-75 and 76-100. This option provides instructors to see success of all students

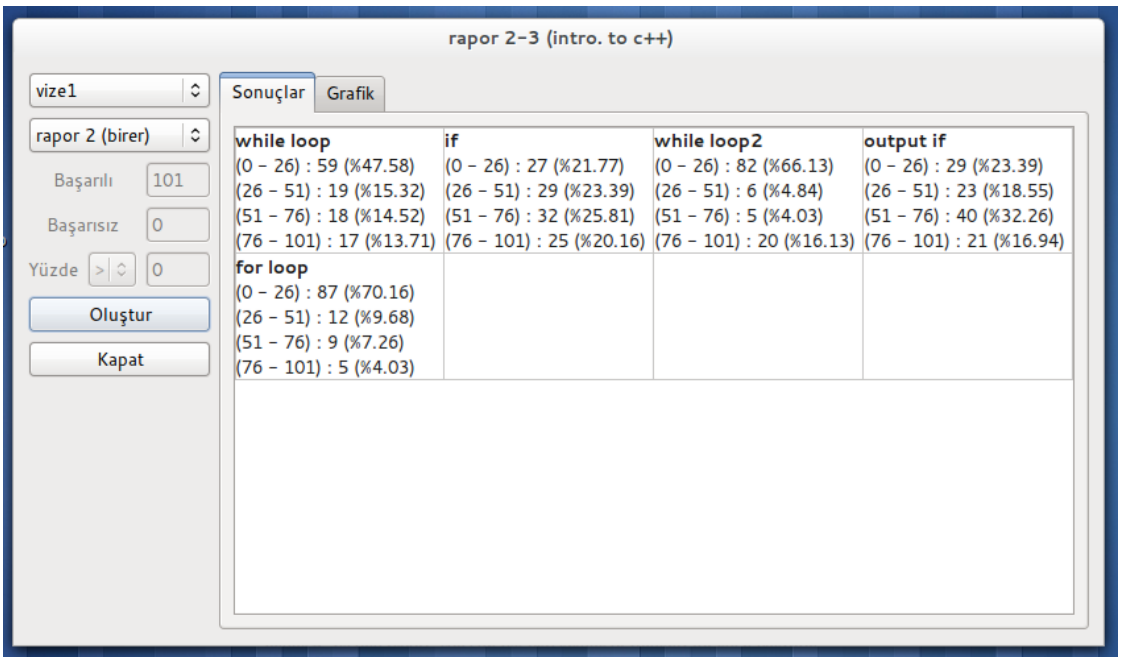


Image 8: second report, you can see percentage of students for each question

together in one look. For example you can see example report in image 8. There are five questions in exam and instructors can see students can not answer first, third and fifth questions. Because for first question half of students scored less than 25 percent of total point. Ratio is 66 percent for third question and 70 percent for fifth question. So instructor can see many students can not understand while loop and for loop topics. On the other hand instructor can see students success for second and fourth questions is satisfactory because ratios are balanced. Also user can see these ratios in graph as you can see image 9. Graph facilitates to understand statistics. You can see unsuccess in first, third and fifth questions at a glance when you look at image 9. Analyzing questions in pairs is another feature of report 2. Therefore instructors can see relations between solving ratios of questions. For example you can see while loop and if relation in first row in image 10. You can see there are 59 students who take less than 25 percent of point of while loop question in first cell of first row. Below

that you can see distribution of 59 students according to success in if question.

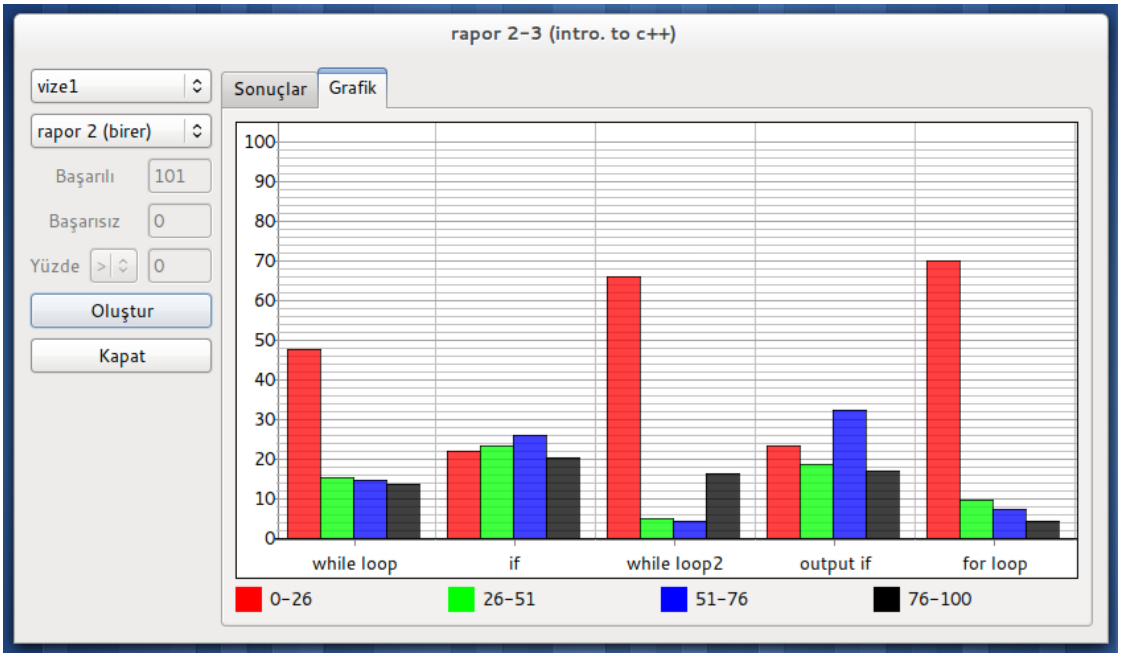


Image 9: graph of second report

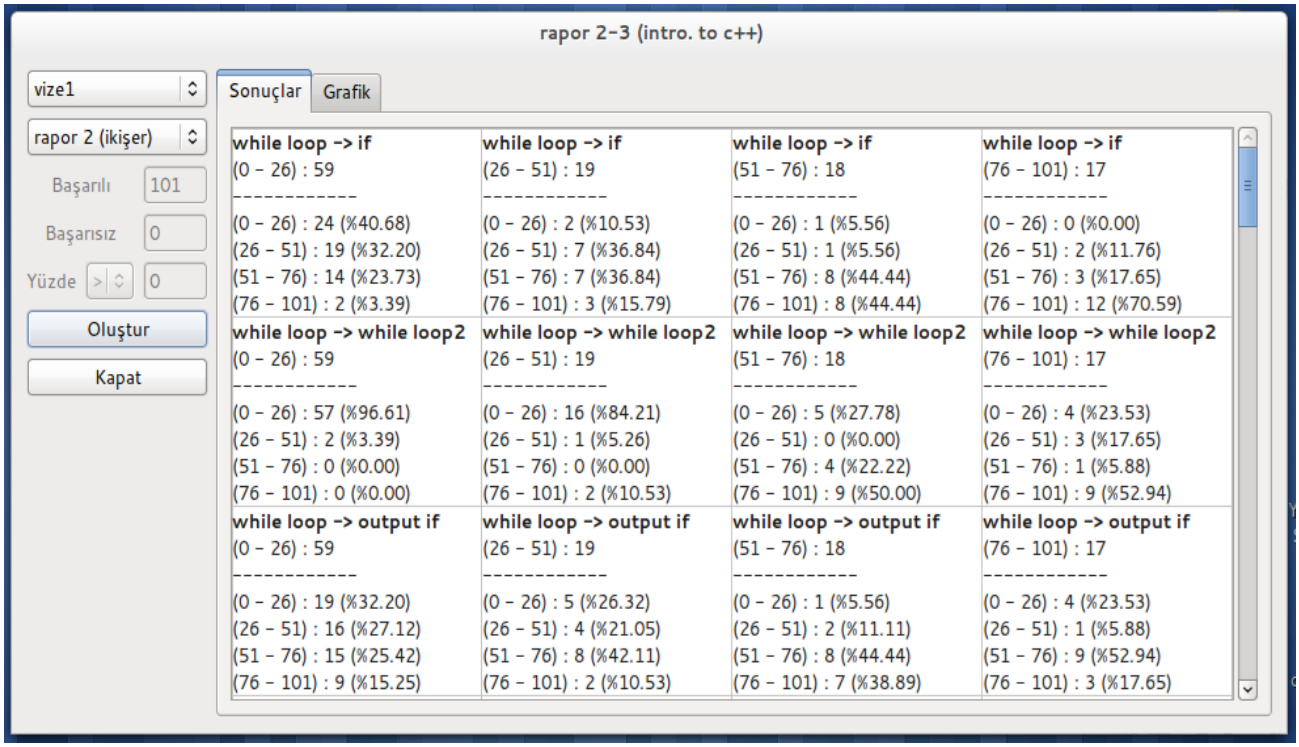
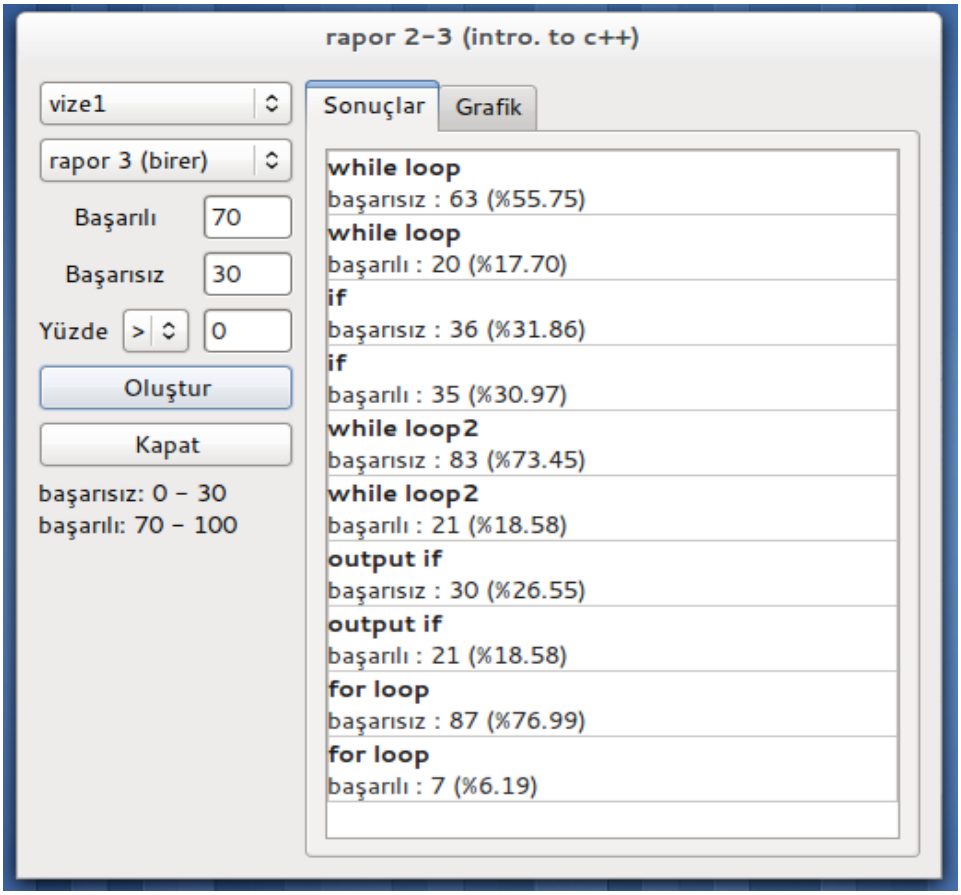


Image 10: second report, you can see success relationship between topics

5.2.3. Report 3

User can decide criterion for success and unsuccess in third option. And then user can see successful and unsuccessful students for all questions. For example you can see results while success criteria is 70-100 and unsuccess criteria is 0-30 in image 11 These numbers is percentage. So for example taking more than 70 percent of point of question is required to succeed. According to this criterion there are 63 unsuccessful and 20 successful students for while loop question. Also results can be shown graphically like in image 12. Graphs help to



user can understand results more easily. System can analyze questions in pairs as you can see image 13 and image 14. For example you can see that 62 of 63 students who do not answer while loop question, do not answer for loop question. Because ratio of students who can not answer both of them is 98 percent. Also it is shown in image 14.

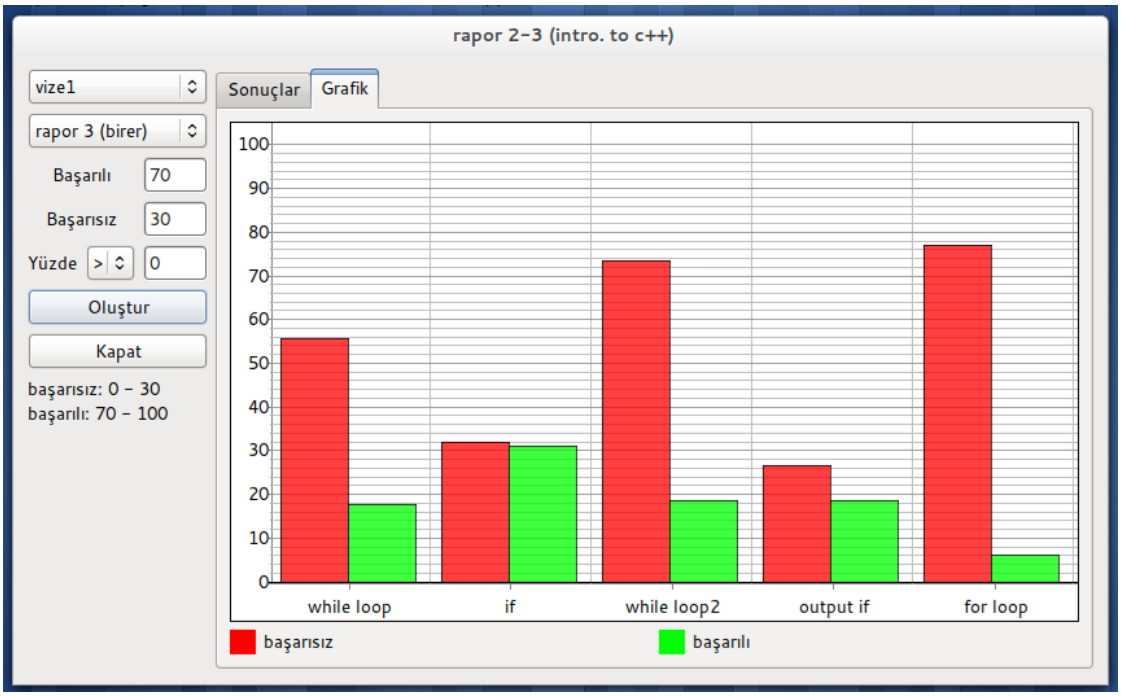


Image 12: graph of third report

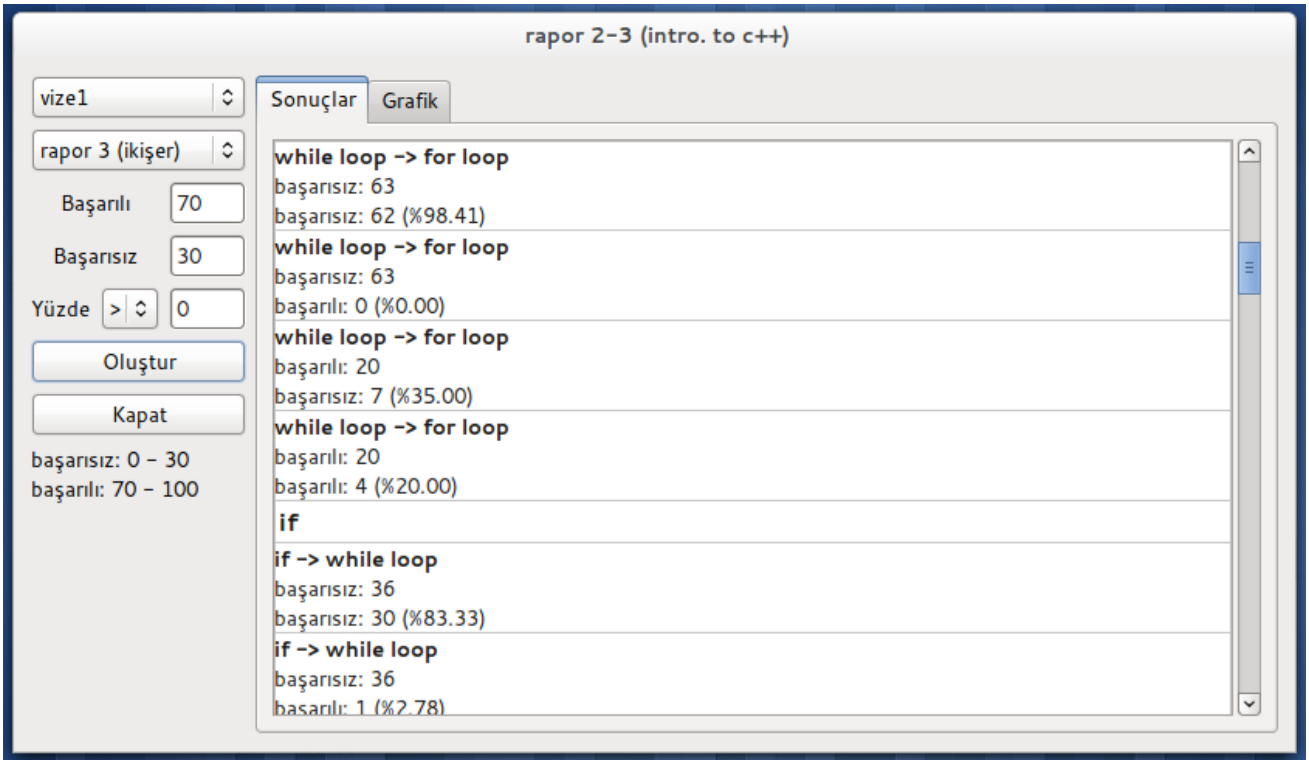


Image 13: third report, you can see success relation between topics according to criteria which are defined by user

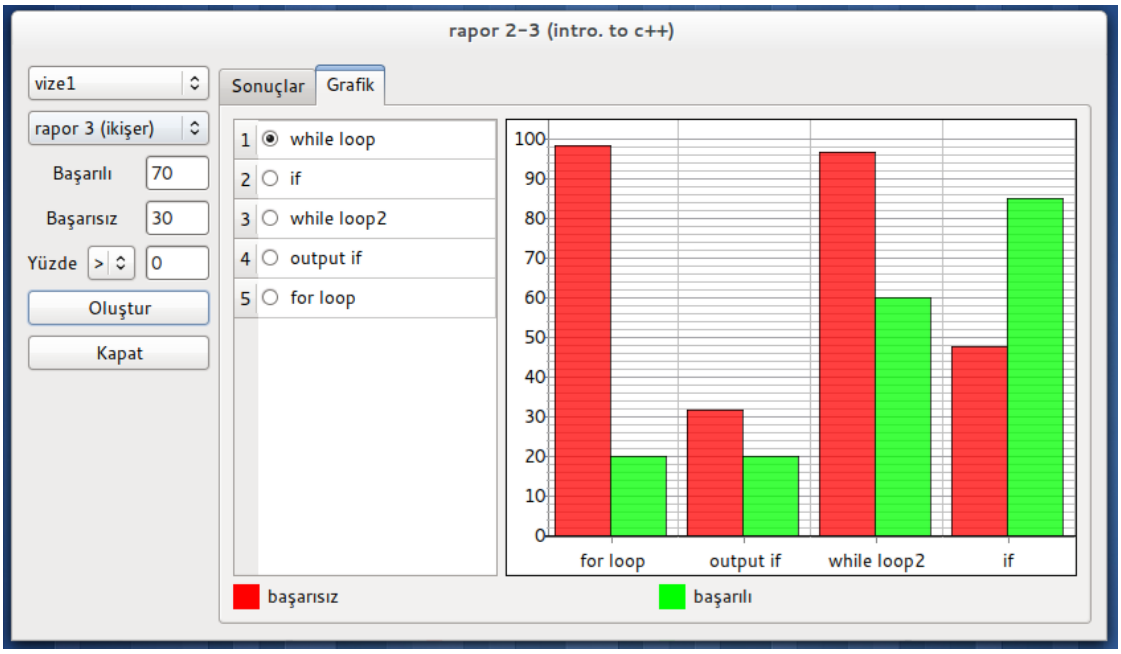


Image 14: graph of third report

5.3. Lists

It is hard to remember all input data after some time. For this reason, I wrote creating list option. User can access list of students and list of exams by clicking button in data entry menu. User can see id, name and grade taken from all exams of students are listed in the list. This helps user to understand which students enter exams and how many points they take. Other list is about exams. User can see name, number of questions, total point and average point of exams. This list helps user to see all exams and properties of exams at a glance.

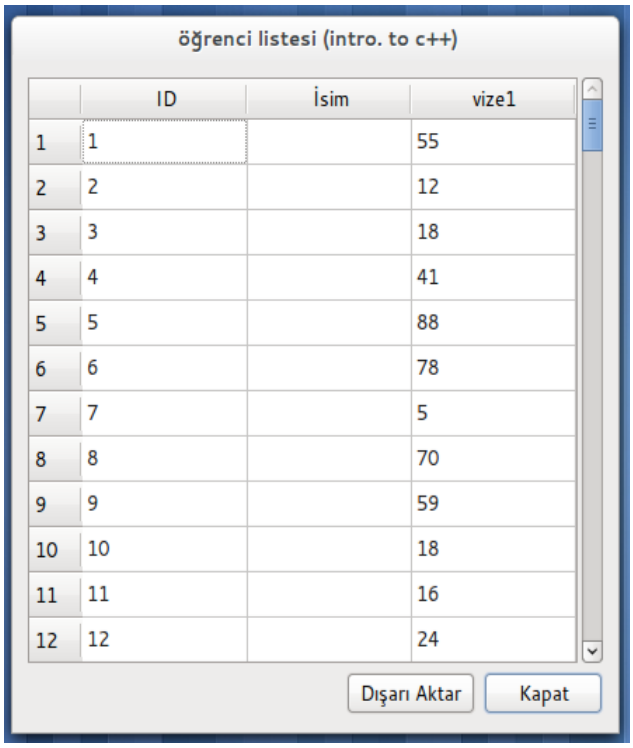


Image 15: list of students

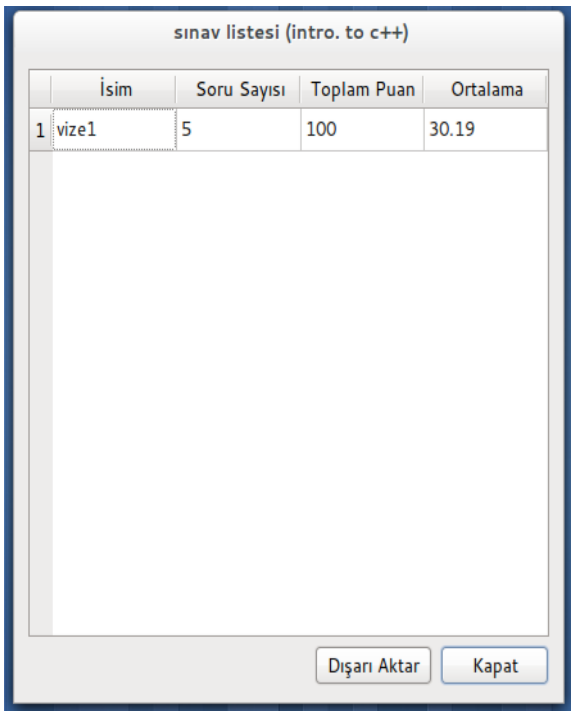


Image 16: list of exams

5.4. Exporting

User can export some data. These are report 1 results and list of students and list of exams. User simply click export button in order to export. When user click the button, a dialog appears. After user select location, data is saved as a csv file. After that this csv file can be opened by using spreadsheet applications.

6. Diagrams

6.1. Flowchart Diagram

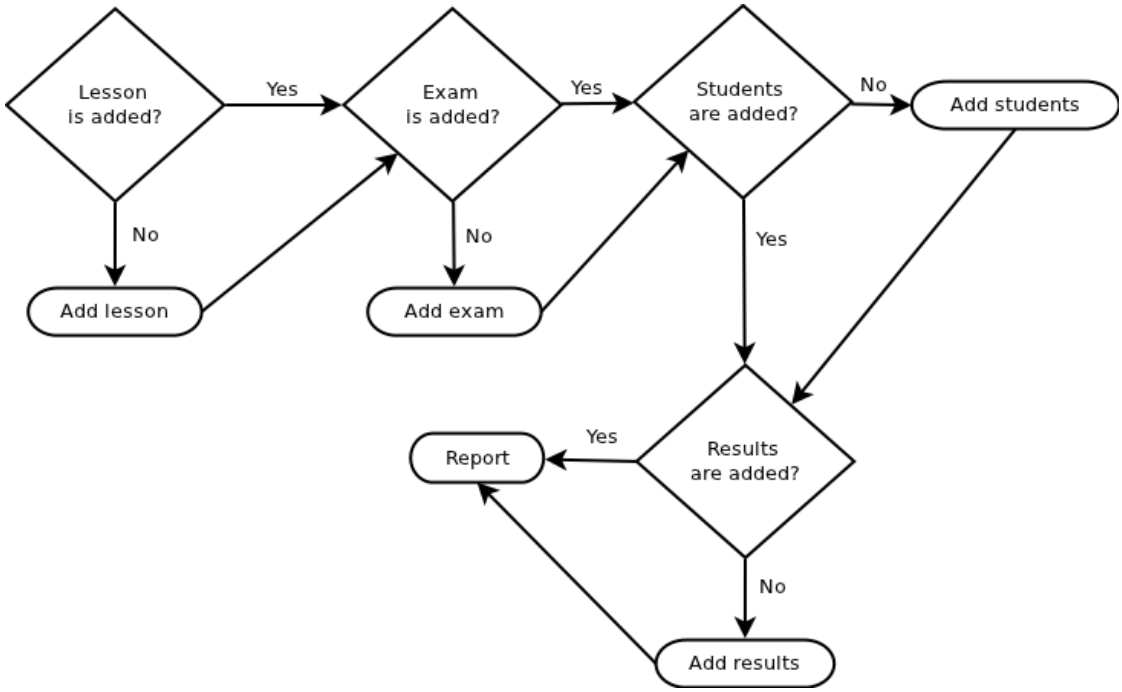


Diagram 1: flowchart diagram

6.2. Data Flow Diagram

Diagram 2: data flow diagram

6.3. Entity Relationship Diagram

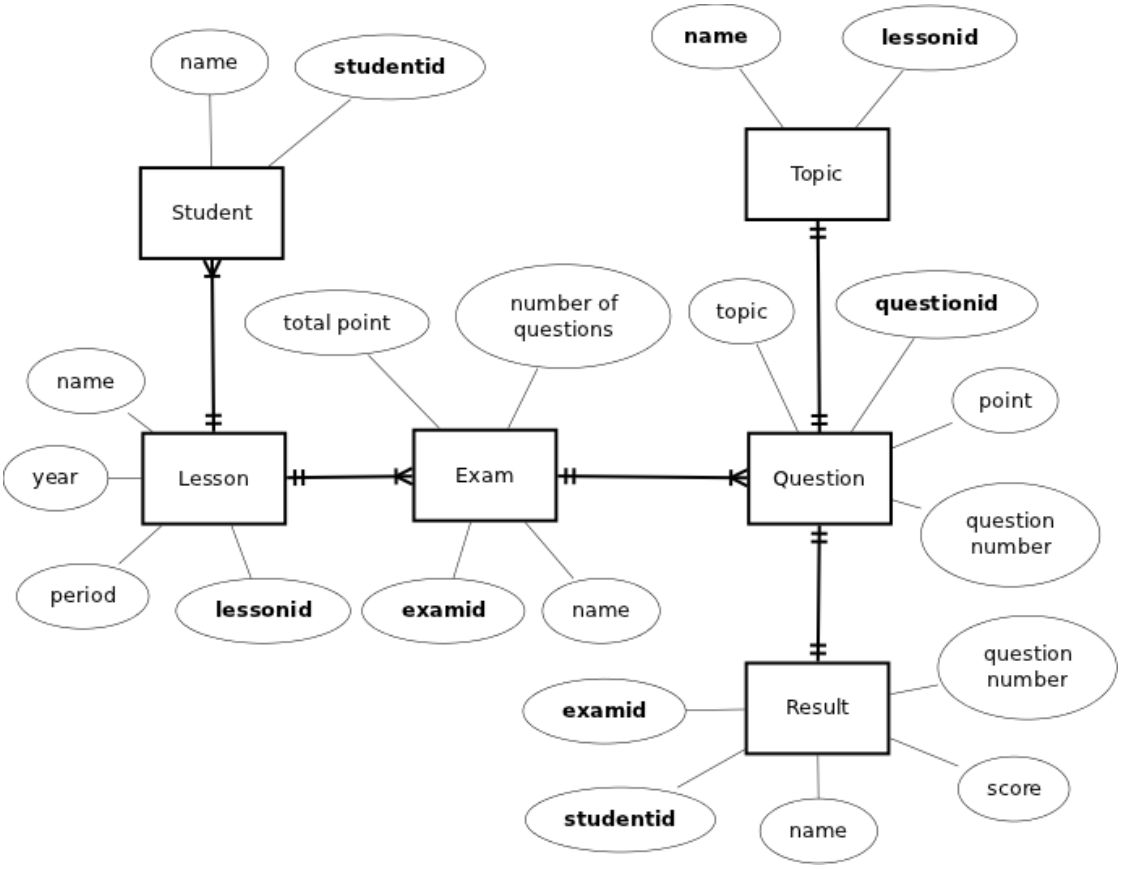


Diagram 3: entity relationship diagram

6.4. Use Case Diagram

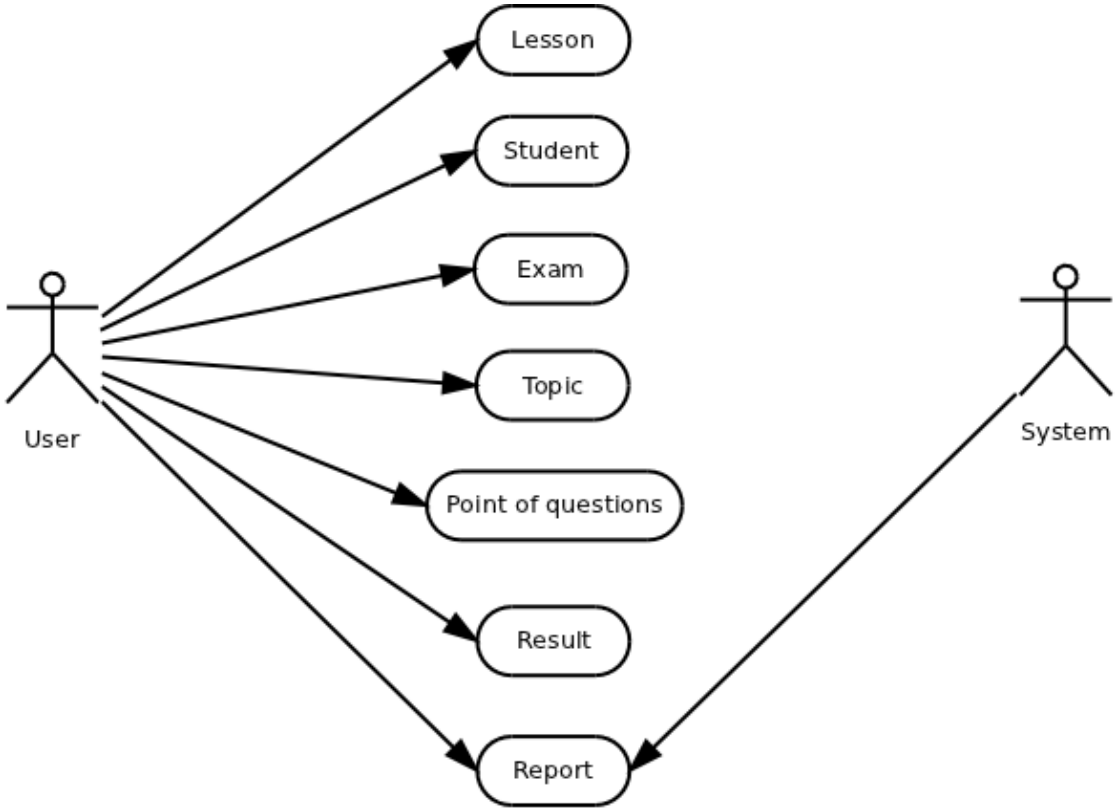


Diagram 4: use case diagram

6.5. Class Diagram

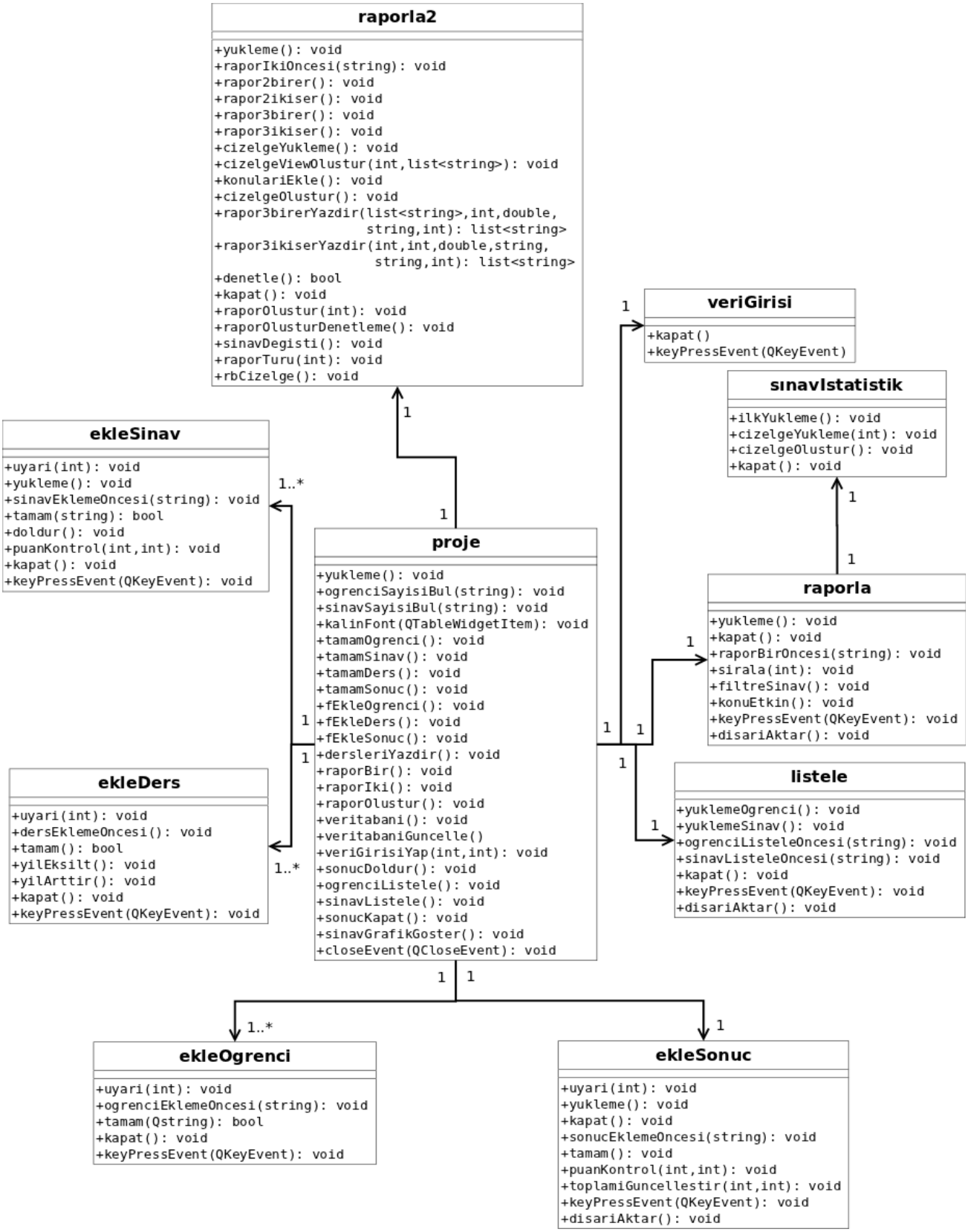


Diagram 5: class diagram

7. Running Project

This application runs on Microsoft Windows, Linux and Mac OS thanks to cross platform support of Qt. Hence source code must be downloaded and compiled. Also user must install required libraries of Qt. If dependencies are provided, compile process success and executable file is created.

7.1. Source Code

Source code of application is on https://github.com/ekcdr/bahcesehirbitirme. You can see codes online and download them.

7.2. Running

7.2.1. Linux

After installing Qt libraries you have to open terminal and move into directory containing project. Then run these commands:

$ qmake proje.pro

$ make

$./proje

7.2.2. Microsoft Windows

You must install MinGW firstly in order to compile project. MinGW is a software port of GNU Compiler Collection and GNU Binutls for use in the development of native Microsoft Windows applications. When you are in directory containing project run these commands:

$ qmake project.pro

$ mingw32-make

Then double click exe file to run.

8. Conclusion

Measuring students achievement and knowledge is a great need in education area. Exams are the most commonly used tools in this regard. And exam results indicate whether students understood lesson. I believe that this application will help instructors to evaluate exams results. And so they can understand student success about lesson better. Thus they know which topics of lesson is not understood and they have chance to improve their students' knowledge.