**11002 CPP Midterm Exam**

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| **Subject: Grade Recorder** |
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| **Main testing concept: Class**   |  |  | | --- | --- | | **Basics** | **Functions** | | ■ C++ BASICS  ■ FLOW OF CONTROL  ■ FUNCTION BASICS  ■ PARAMETERS AND OVERLOADING  ■ ARRAYS  ■ STRUCTURES AND CLASSES  ■ CONSTRUCTORS AND OTHER TOOLS  □ OPERATOR OVERLOADING, FRIENDS,AND REFERENCES  □ STRINGS  □ POINTERS AND DYNAMIC ARRAYS | □ SEPARATE COMPILATION AND NAMESPACES  □ STREAMS AND FILE I/O  □ RECURSION  □ INHERITANCE  □ POLYMORPHISM AND VIRTUAL FUNCTIONS  □ TEMPLATES  □ LINKED DATA STRUCTURES  □ EXCEPTION HANDLING  □ STANDARD TEMPLATE LIBRARY  □ PATTERNS AND UML | |
| **Description:**  Write a program that records students’ grades and print some information of them.  There are two class(Student, Class) you must implement.  The class **Student** includes at least the following member functions:  Note: Student should have their own id number from 0.  **Constructor**  **Student();**  If no student name input, you should give it a name named "Student+COUNT"  e.g. Student0, Student1…  **Student(std::string name)**  If the input name is same, replace the name with "Student+COUNT" and print  “Error:The name "WRONG\_NAME" has exist. Use default name:Student+COUNT.”  **void addGrade(std::string subject, float point);**  Record grade into Student data  If the subject is exist, replace the point of grade.  **void deleteGrade(std::string subject);**  Delete the grade.  If the subject is not exist. Print" Error:Subject SUBJECT not Found.".  **void deleteGrade();**  Delete all grades.  **void printGrade() ;**  Print id / name and each subject / point.  e.g.  Id:0 Name:Student0  Chinese 87  OOP 60  If no grade exist, Print " Error:Grade not Found.".  The class **Class** includes at least the following member functions:  **Constructor**  **Class()**;  **void addStudent(Student student);**  add student to Class.  If student has in class, print ”Error:The student STUDENT\_NAME has in class.”  **void deleteStudent(Student student);**  Delete student from Class.  **void deleteStudent(std::string studentName);**  Delete student from Class.  If **studentName** not found, print” Error:Student **studentName** not found.  “  **void printNumOfStudent(std::string subjectName);**  Print the subject name and its number of students.  If **subjectName** not found, print” Error:Subject **subjectName** not found.  e.g. OOP 4  **void printNumOfStudent();**  Print all of subject name and its number of students.  **void printAvgScore(std::string subjectName);**  Print the subject name and its average score.  e.g. OOP 60  If **subjectName** not found, print” Error:Subject **subjectName** not found.  **void printAvgScore( );**  Print all of the subject name and its average score.  **void printSubjectInformation ( );**  **void printSubjectInformation (std::string subjectName);**  print information of the subject  e.g.  Subject name:OOP  Num of students:4  Student0 60  John 60  Student1 60  Student 60  If **subjectName** not found, print” Error:Subject **subjectName** not found.  **Please note that:**  We will provide main.cpp to test your class.  You must put the header file(Recorder.h) to the same dictionary.  **Input:**  Substitution of your main function.  **Output:**  Please refer to the sample output.  **Sample Input / Output：**   |  |  | | --- | --- | | Sample Input | Sample Output | | According to the given main function1.: | Id:0 Name:Student0  Chinese 87  Id:1 Name:John  OOP 60  Chinese 1  OOP 2  OOP 2  Chinese 87  OOP 60  OOP 60  Subject name:OOP  Num of students:2  John 60  Cena 60  Subject name:Chinese  Num of students:1  Student0 87  Subject name:OOP  Num of students:2  John 60  Cena 60  Chinese 87  OOP 60 | | According to the given main function2.: | Error:The name John has exist.Use default name:Student.  Id:0 Name:Student0  Chinese 87  OOP 60  Id:1 Name:John  Error:Grade not Found.  Error:Subject Chinese not Found.  Id:1 Name:John  OOP 60  Error:The student Cena has in class.  Chinese 1  OOP 4  English 1  Error:Subject Art not found.  Error:Student a not found.  Chinese 87  OOP 60  English 92  OOP 60  Subject name:OOP  Num of students:4  Student0 60  John 60  Student1 60  Student2 60  Error:Subject Art not found.  Subject name:Chinese  Num of students:1  Student0 87  Subject name:OOP  Num of students:4  Student0 60  John 60  Student1 60  Student2 60  Subject name:English  Num of students:1  Cena 92  Chinese 87  OOP 60  English 92 | |
| **□ Eazy,Only basic programming syntax and structure are required.**  **□ Medium,Multiple programming grammars and structures are required.**  **■ Hard,Need to use multiple program structures or complex data types.** |
| **Expected solving time:**60 minutes |
| **Main function1:**  #include "Recorder.h"  int main()  {  Student a = Student();  Student b = Student("John");  Student c = Student("Cena");  a.addGrade("Chinese", 87);  a.addGrade("OOP", 60);  a.deleteGrade("OOP");  a.printGrade();  b.addGrade("OOP", 60);  b.printGrade();  c.addGrade("OOP", 60);    Class myClass;  myClass.addStudent(a);  myClass.addStudent(b);  myClass.addStudent(c);  myClass.printNumOfStudent();  myClass.printNumOfStudent("OOP");  myClass.printAvgScore();  myClass.printAvgScore("OOP");  myClass.deleteStudent("John");  myClass.deleteStudent(b);  myClass.printSubjectInformation("OOP");  myClass.printSubjectInformation();  myClass.printAvgScore();  return 0;  }  **Main function2:**  #include "Recorder.h"  int main()  {  Student a = Student();  Student b = Student("John");  Student c = Student("John");  Student d = Student("Student123");  Student e = Student("Cena");  a.addGrade("Chinese", 87);  a.addGrade("OOP", 77);  a.addGrade("OOP", 60);  a.printGrade();  b.printGrade();  b.addGrade("OOP", 60);  b.deleteGrade("OOP");  b.deleteGrade("Chinese");  b.addGrade("OOP", 60);  b.printGrade();  c.addGrade("OOP", 60);  d.addGrade("English", 88);  d.addGrade("OOP", 60);  d.deleteGrade();  d.addGrade("OOP", 60);  e.addGrade("English", 92);    Class myClass;  myClass.addStudent(a);  myClass.addStudent(b);  myClass.addStudent(c);  myClass.addStudent(d);  myClass.addStudent(e);  myClass.addStudent(e);  myClass.printNumOfStudent();  myClass.printNumOfStudent("Art");  myClass.deleteStudent("a");  myClass.deleteStudent(b);  myClass.deleteStudent(e);  myClass.printAvgScore();  myClass.printAvgScore("OOP");  myClass.printSubjectInformation("OOP");  myClass.printSubjectInformation("Art");  myClass.printSubjectInformation();  myClass.printAvgScore();  return 0;  } |