OOSE
Quiz1

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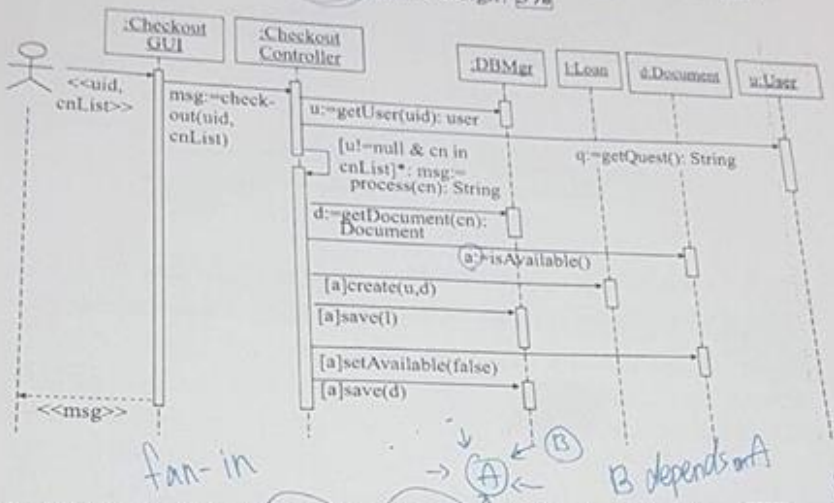
1. Describe MVC in the following diagram and indicate the creator, controller, and expert. Why do we need the DBMgr in this design? 5%

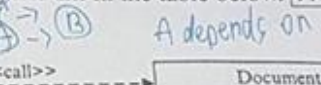


fan-in

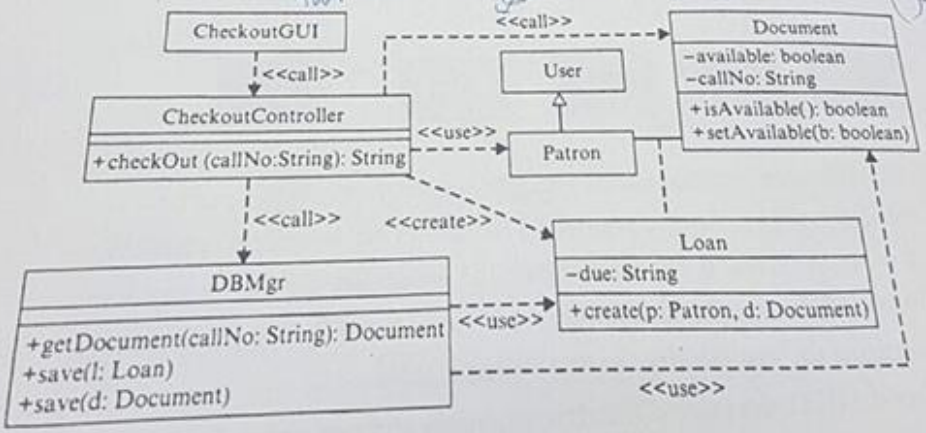
B depends on A

2. Calculate the number of fan-in and fan-out and fill in the table below. 4%

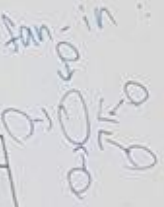
fan-out



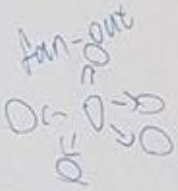
A depends on B



fan-in :

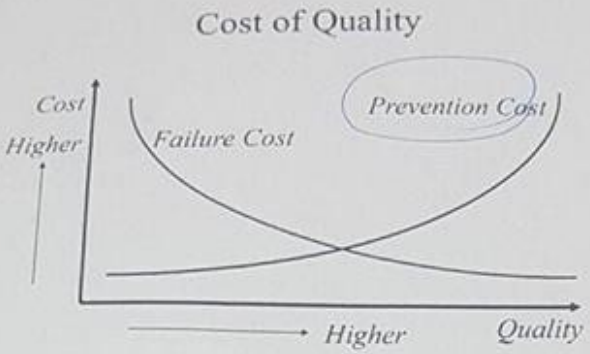


fan-out

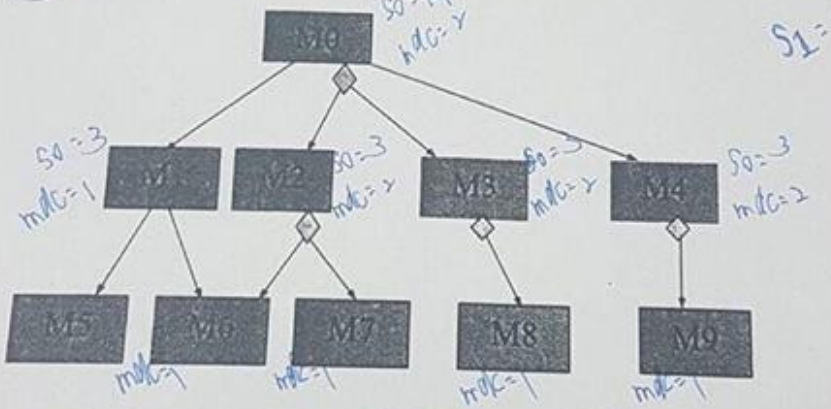


	Fan-In	Fan-Out
Patron	1	1
Loan	2	0

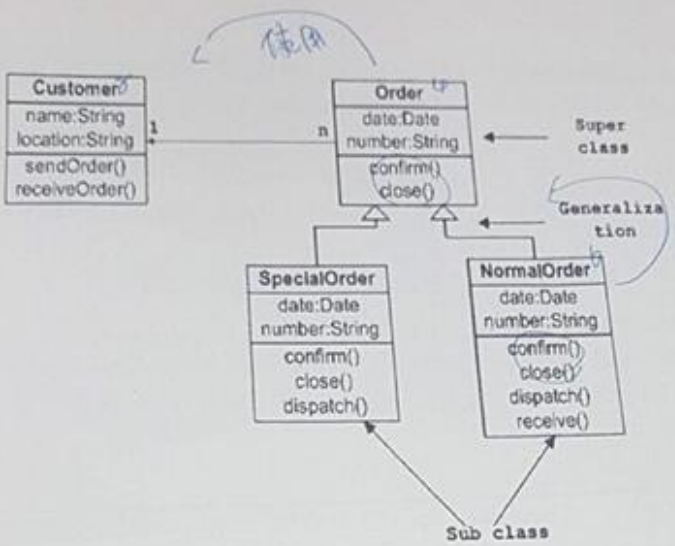
3. Give the cost of quality figure below, please explain the meaning and its implication to system design. 3% What is it related to testing and debugging? 2%



4. What is the design complexity of M0 in terms of S0 and mdc? 2% What is the number of integration test required for this module? 2% Please indicate the paths. 2%

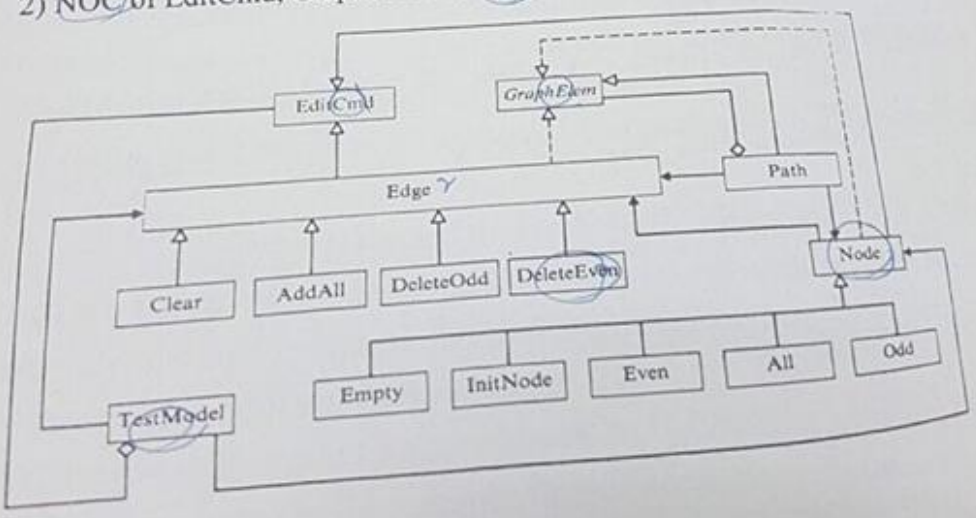


5. State the difference between global variable and singleton. 5%
6. Suppose that during a 300-day period, 15 failures occur to system A and 20 failures occur to system B. Please compute the **reliability** for the two systems. 2% If it takes 5 days to fix each failure for system A and 2 days for system B. Please compute the **availability** for two systems. 2%
7. The higher the RFC, the more difficult to maintain and reuse the class due to higher dependencies of the class on other classes. What is the RFC(Customer), RFC(Order) and RFC(NormalOrder)? 3%



8. A stack class implemented with a fix size array and seven methods: push(int x), pop(), top(), isEmpty(), isFull(), peek(), and Stack() as its methods. The push(int x) and pop() methods need to check if the stack is empty and full, respectively. The other methods have complexity 1. What is the Weighted Methods per Class (WMC) for the stack class? 2%

9. Based on the following figure, please compute 1) DIT of TestModel, DeleteEven, 2) NOC of EditCmd, GraphElem, 3) CBO of TestModel, Node. 6%



LCOM = n×(n-1)/2 - 2×~

10. If M1 has a,b,c attributes, M2 has b,c attributes, M3 has a, e attributes, M4 has b attribute, please calculate the LCOM of the following class. 3%

n=4.

4×(4-1)/2 - 2×3.

4×3/2 - 6

= 12/2 - 6 = 6-6 = 0.

A
a,b,c,d,e
M1()
M2()
M3()
M4()

M1 : a, b, c

M2 : b, c

M3 : a, e

11. A requirement is stated as: "Children under 2 will receive 90% discount" and "Children between 2 and12 pay half price." It may have 4 possible interpretations as the table below. Please evaluate the result and state your comment in each cell. 4%

Under 2 (90%)	Between 2 and 12 (50%)	Result
[0,2)	(2,12)	
[0,2)	[2,12]	
[0,2]	[2,12]	
[0,2]	(2,12)	

12. Draw a flow graph based on the following statement. 2% Determine the independent paths and state the paths. 2%

```
Function fn_delete_element (int value, int array_size, int array[])
{
        1 int i;
        location = array_size + 1;

        2 for i = 1 to array_size
        3 if ( array[i] == value )
        4 location = i;
         end if;
         end for;

        5 for i = location to array_size
        6 array[i] = array[i+1];
        end for;
        7 array_size --;
}
```

13. Given the condition is e1 <rel_op> e2, what its test cases will be? 2%

14. The black-box testing example of purge function L = A1, A2, … An, L' = A1', A2', … Am' m <= n. Please describe the input and output of all the test cases. 4%

Functional testing

15. Please count the value of cyclomatic complexity of the following example. 2%

```
int i {
if (n>o) {
switch(n) {
case 0: case1 : printf("zero or one\n");
break;
case2: printf("two\n");
break;
case3: case4: printf("three or four\n");
break;
}
} else
printf ("negative\n");
}
```

16. If the minimum TOEFL scores for admission is 80, and the highest score is 120, which testing technique can be applied in this situation? Please describe the valid and invalid test classes. 2%

17. An array has a defined limit of 100 entries, please design test cases to exercise the data structure at its boundary. 2%

18. One of the graduate admission criteria of a computer science (CS) department is GPA $\geq$ 3.0. However, if the student's undergraduate major is not computer science, then the student must take deficiency courses. Please apply an equivalence partition test to this application. List each partition and state its result. 5%

19. _____ is a test to check if the system can respond to many simultaneous requests. For example, if an information system for online shopping is required to interface with 6000 customers, this kind of test evaluates how the system performs with more than 6000 simultaneous users. 2%

20. Validation testing is to test whether the software functions in a manner that can be reasonably expected by the customer. One method performed by a limited number of end users in the target environment is called _____. Another one is a test with users exercising the system in the development environment called _____. 4%

21. What are the pros and cons of top-down testing. 5%

22. "Zero failure" method is an approach to determine when to stop testing. Consider the testing of a 100K line program for project A and a 50K line program for project B. Project A requires no more than 2 failures per thousand lines of code to be detected by the customer. Project B requires no more than 1 failure per thousand lines of code to be detected by the customer. Suppose that each project has been detected the same number of **20 failures** and fixed in the total test execution time of **600 and 500 hours**, respectively. Please fill in the parameter values (Nf, Nd, Ht) in the following formula for two projects. **2%**

$$Hz = Ht * \left(\ln \frac{Nf}{0.5+Nf}\right) / ln \frac{0.5+Nf}{Nd+Nf}$$

If the results of Hz of Project A is 62 and of Project B is 77. No failure has been detected in the last **40** test hours for Project A, and **50** test hours for Project B. When to stop testing for these two projects? **2%**

23. What are the types of software maintenance of Façade and Mediator patterns? **2%**

24. Please draw the corresponding decision table based on the given pseudocode. The decision table should consist of rule numbers, condition stubs, condition entries, action stubs, and action entries. Does the number of cc counted from the pseudocode correspond to the number of rules of the decision table? What would you do, if they are not the same? **10%**

```
if (weight <= 150)
  if (length <= 108)
    if (length + girth <=130)
      rate by weight;
    else
      if (length + girth <= 165) {
        rate by greater of weight and dim.
          weight;
        add $45 surcharge to each package;
      } else
        reject package;
  else
    if (length <= 119)
      if (length + girth <= 165) {
        rate by greater of weight and dim.
          weight;
        add $45 surcharge to each package;
      } else
        reject package;
else
  reject package;
```

weight -> ≤ 150

length -> 108 ~ 119

length + girth

↳ 130 ~ 165.

150 True

↓

length ≤ 119 True

↓ ↓

108

↓

165

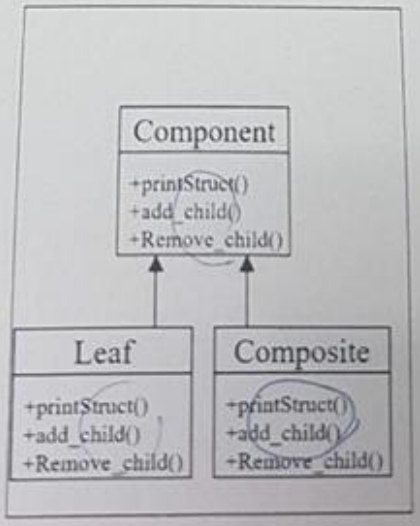
else reject package.

可不符合

修改

1 2 3 1 9

25. There is a trade-off between safety and transparency for applying composite pattern. Please use the following diagram to describe the difference of both. Which one is the main concern of this pattern? **5%**



transprency

safety