

QUIZ NAVIGATION

12

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State Never submitted

Question 1

Not yet answered

Marked out of 40.00

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A Newspaper House publishes daily newspaper and wants to manage its activities through a **Story Management System (SMS)**. You are to develop the **SMS**. The requirements specification of the system is given below. Read the specifications carefully, analyse the requirements, and design the following aspects of the system using UML and also prepare the test plan. Answer the following questions in this background.

- (a) Identify the use-cases and design suitable Use-Case Diagrams for **SMS**. Identify the actors, specify their types, and mark the relationships between the actors. Show the <<include>>, <<extend>>, and generalization relationships of the use-cases. [5]
- (b) Design Class Diagrams for *Story*, detailing the attributes and operations with their properties. [5]
- (c) Show all other classes (in addition to *Story*) by brief Class Diagrams (with name and key attributes). [4]
- (d) For the entire collection of classes (that is, including *Story*) show the associations, aggregations / compositions, generalization / specialization, and abstract / concrete etc. [6]
- (e) Design suitable Sequence Diagrams for use-cases arising from *Submit (of Reporter)*, *Review (of Manager)*, *Revise (of Reporter)*, and *Approve (of Manager)* actions. [2+3+2+3=10]
- (f) Prepare a test plan for **SMS** to perform black-box tests. Clearly mark the scenarios for Unit Testing and Integration Testing. [5+5=10]

Requirements Specification for Story Management System (SMS)

- (a) The employee structure of the **Newspaper House** is as follows:
- *Editor*. The *Editor* is responsible for the overall activities and directly manages the *Editorial Division*.
  - *Associate Editors*. Every *Associate Editor* is responsible for a *Division* and reports to the *Editor*. No *Associate Editor* manages more than one *Division*.
  - *Reporters*. Every *Reporter* works for a *Division* and reports to the corresponding *Associate Editor* (also called *Manager*). *Reporters* working for the *Editorial Division* reports directly to the *Editor*.
- Every employee is identified by the *Employee Code*, and has *Name*, *Email* and *Mobile Number*.
- (b) The **Newspaper House** has 3 *Divisions*:
- *Editorial Division*: This publishes the *Editorial* expressing the views of the **Newspaper House**, *Special News Items* and the *Letters from Readers*.
  - *News Division*: This publishes stories on national and international news. A story here is political, social, or economic in nature.
  - *Features Division*: This publishes national and international feature stories in art, culture, cinema, sports, and the like. A story here is an entertainment event report, critique, celebrity interview, match report, team analysis, or statistics.
- Every *Division* has a *Manager*. With the exception of the *Editorial Division*, every *Division* is managed by an *Associate Editor*. The *Editorial Division* is managed directly by the *Editor*.
- (c) At the **Newspaper House** a *Reporter* needs to:
- *Collect*: A reporter goes to places or liaison with external agencies to collect news items.
  - *Compose*: A collected news item is cast in the form of a story.
  - *Submit*: A completed story is submitted to the corresponding *Manager*.
  - *Revise*: Up on review, if the *Manager* desires, the story is revised and re-submitted.
- (d) At the **Newspaper House** the responsibilities of an *Associate Editor* include all responsibilities of a *Reporter*. Naturally she / he can report their own stories. In addition, an *Associate Editor* needs to:
- *Review*: A story submitted by a reporter (of the *Division*) needs to reviewed and edited. Up on review, the *Associate Editor* may request the *Reporter* to revise and re-submit.
  - *Approve*: A submitted story may and may not be approved – with or without revision.
  - *Paginate*: Compose the day's page/s with the approved stories of the *Division*.
- (e) At the **Newspaper House** the responsibilities of the *Editor* include all responsibilities of an *Associate Editor* (and hence those of a *Reporter*). In addition, the *Editor* needs to:

- *Edit*: Manage the *Editorial Division*, write the editorial, and set & comply with the policies for the **Newspaper House**.

(f) A *Story*:

- Is a piece of text for publication in the newspaper.
- Has title, place, date-time, sources (optional), and reporter / associate editor (optional).
- Is of a type that matches the *Division* in which it is published.
- Has a nature as specified above under different *Divisions*.

(g) The *Work flow* in the **Newspaper House** is as follows:

- A *Reporter* collects a news item from primary lead, secondary agency or continuity of events. She / he explores the details and prepares the facts.
- The *Reporter* then composes the facts in terms of a *Story* filling in the necessary and auxiliary parts.
- Once composed, the *Reporter* submits the *Story* for review.
- The *Manager* of the *Division* retrieves the submitted *Story* and takes one of the actions as follows:
  - Review & edit and approve the *Story* for publication.
  - File review comments on the *Story* for the *Reporter* (who wrote the *Story*) to make revisions. The *Reporter* then revises the *Story* and submits again for review.
  - Review and disapprove the *Story*. This *Story* will not be published.
- Once the cut-off time for the day is over, the *Associate Editor* of the *Division* will preview the approved stories and prepare the page/s for the *Division*. Stories selected for a day during pagination are marked published and will not be selected again. Other stories continue to remain in **SMS** for possible publication in future.
- The *Editor* reviews the page/s for compliance to the policies of **Newspaper House**. If a *Story* is found to be non-compliant, the *Editor* may ask the corresponding *Associate Editor* to revise or replace the *Story*.
- Once all stories become compliant, the *Editor* adds the *Editorial* and orders publication.
- The newspaper goes to press.

Every action in **SMS** generates notification (by email) to all concerned stakeholders.

Question 2

Not yet answered

Marked out of 10.00

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2. You are given the following code for **SecantSolver** function to solve for an equation  $f(x) = 0$  by Secant Method starting from initial estimates  $x_0$  and  $x_1$ . You need to prepare tests for the code.

```
/*01:*/ typedef double (*T) (double);
/*02:*/ void SecantSolver(
/*03:*/     T f,           // Function f to solve for f(x) = 0
/*04:*/     double x0,      // First initial iteration
/*05:*/     double x1,      // Second initial iteration
/*06:*/     int nIter,      // Maximum number of iterations
/*07:*/     double epsilon) { // Precision
/*08:*/
/*09:*/     double x_n_minus_1 = x1, x_n_minus_2 = x0;
/*10:*/     int count = 1;
/*11:*/     double x;
/*12:*/
/*13:*/     do {
/*14:*/         x = (x_n_minus_2*f(x_n_minus_1) - x_n_minus_1*f(x_n_minus_2)) /
/*15:*/             (f(x_n_minus_1) - f(x_n_minus_2));
/*16:*/         x_n_minus_2 = x_n_minus_1;
/*17:*/         x_n_minus_1 = x;
/*18:*/         cout << "Iteration No: " << count << " x = " << x << endl;
/*19:*/         ++count;
/*20:*/         if (count == nIter)
/*21:*/             break;
/*22:*/     }
/*23:*/     while (fabs(f(x)) > epsilon);
/*24:*/     cout << "The solution is: " << x << endl;
/*25:*/ }
```

Design a testplan for **SecantSolver** covering the following scenarios:

- (a) Black Box Tests
- Equivalence Class Tests for function parameter [3]
  - Equivalence Class Tests for other parameters [3]
  - Boundary Value Cases [2]
- (b) White Box Tests
- Statement Coverage Tests [2]

The following is not directly part of the question. However, you may want to refer to it if you are not familiar with the Secant Method.

The *Secant Method* is used to find the roots of a continuous real-valued function  $f(x)$  within an interval  $[a, b], a < b$ . That is, to find solutions of  $f(x) = 0$  such that  $a \leq x \leq b$ . It is an iterative method that uses a succession of roots of secant lines to better approximate a root of a function  $f$ . It is defined by the recurrence:

$$x_n = x_{n-1} - f(x_{n-1}) \frac{x_{n-1} - x_{n-2}}{f(x_{n-1}) - f(x_{n-2})} = \frac{x_{n-2}f(x_{n-1}) - x_{n-1}f(x_{n-2})}{f(x_{n-1}) - f(x_{n-2})}$$

It requires two initial values,  $x_0$  and  $x_1$ , which should ideally be chosen to lie close to the root to start the process of iteration and continues till  $f(x_n)$  gets arbitrarily close to 0. That is,  $|f(x) - 0| < \epsilon$ , where  $\epsilon$  is a very small positive value like  $10^{-6}$ . To ensure that the process always terminates, the method also uses an upper bound ( $n$ ) on the number of iterations.

For example, if  $f(x) = x^2 - 4$ ,  $x_0 = 1.6$ ,  $x_1 = 2.3$ ,  $\epsilon = 0.0000001$ , and  $n = 4$ , the successive roots by the Secant method computes as:  $x_2 = 1.969231$ ,  $x_3 = 1.997838$ ,  $x_4 = 2.000017$ ,  $x_5 = 2.000000$ . Naturally,  $x = x_5 = 2.000000$  is the final solution as the iterations converge.