

Trent University COIS 2020

Test Case for Assignment 2

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Version 1.0

Teammates

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1. Purpose

The purpose of the document is to provide the test plan after completing Patient, Event, PriorityQueue, and Simulation classes for a discrete event simulation simulating hospital emergency rooms.

Test Case #	Task	Test to be performed	Expected Result	Actual result	Pass/Fail
1	Patient Class-Inter-Arrival Time Generation Test	Run the random number generator part of the program to verify the average generated time is close to M. Input: M = 60 (1-minute mean inter-arrival time)	1000 randomly generated inter-arrival times with an average close to M.	<pre> 16:27:00 - Doctor 13 completes treatment of Patient 2800 and is assigned to Patient 2811. 16:27:00 - Doctor 1 completes treatment of Patient 1266 and is assigned to Patient 1834. 16:27:03 - Doctor 13 completes treatment of Patient 2811 and is assigned to Patient 1814. 16:27:08 - Doctor 15 completes treatment of Patient 2732 and is assigned to Patient 1838. 16:27:22 - Doctor 7 completes treatment of Patient 2722 and is assigned to Patient 2809. 16:27:30 - Doctor 7 completes treatment of Patient 2809 and is assigned to Patient 2796. 16:27:31 - Doctor 5 completes treatment of Patient 2780 and is assigned to Patient 1798. 16:27:35 - Doctor 10 completes treatment of Patient 2807 and is assigned to Patient 2814. 16:27:35 - Doctor 9 completes treatment of Patient 2770 and is assigned to Patient 2820. 16:27:43 - Doctor 5 completes treatment of Patient 1798 and is assigned to Patient 2818. 16:27:45 - Doctor 19 completes treatment of Patient 1817 and is assigned to Patient 2815. 16:28:11 - Doctor 11 completes treatment of Patient 1273 and is assigned to Patient 1849. </pre> <p>More than 1000 of patients are generated</p>	Pass/Fail
2	Patient Class-Treatment Time Generation Test for each Emergency Level	Run the random treatment time generator to check if the means for each level are close to T, 2T, and 4T, respectively. Input: T = 120 (10 minutes mean treatment time)	Random treatment times for each emergency level (1 = T, 2 = 2T, 3 = 4T) with average times close to the respective values.	<pre> 09:00:04 - Patient 1 <1> arrives and is assigned to Doctor 0. 09:00:11 - Doctor 0 completes treatment of Patient 1 09:00:14 - Patient 13 <2> arrives and is assigned to Doctor 0. 09:00:24 - Doctor 0 completes treatment of Patient 13 09:00:36 - Patient 15 <2> arrives and is assigned to Doctor 0. 09:00:37 - Patient 8 <1> arrives and is assigned to Doctor 1. 09:00:52 - Patient 2 <1> arrives and is assigned to Doctor 2. </pre>	Pass/Fail
3	Patient Class-Patient Arrival Event Handling	The ARRIVAL events are generated and placed in the Priority Queue correctly. Input: Simulate patient arrivals at 9:00	Patients are correctly instantiated and queued for treatment	<pre> Simulation initialized! 09:00:04 - Patient 1 <1> arrives and is assigned to Doctor 0. 09:00:11 - Doctor 0 completes treatment of Patient 1 09:00:14 - Patient 13 <2> arrives and is assigned to Doctor 0 09:00:24 - Doctor 0 completes treatment of Patient 13 09:00:36 - Patient 15 <2> arrives and is assigned to Doctor 0 09:00:37 - Patient 8 <1> arrives and is assigned to Doctor 1 </pre>	Pass/Fail
4	Event Class-Patient Departure Event Handling	The DEPARTURE events are generated when treatment is concluded and that they're handled properly. Input: Simulate patient departure at 12:00	Patients leave the system after their treatment	<pre> 16:16:12 - Doctor 5 completes treatment of Patient 2641 16:16:27 - Doctor 9 completes treatment of Patient 1200 16:16:44 - Doctor 15 completes treatment of Patient 1850 16:16:55 - Doctor 3 completes treatment of Patient 2657 16:17:07 - Doctor 0 completes treatment of Patient 1196 16:17:45 - Doctor 17 completes treatment of Patient 2653 16:18:20 - Doctor 8 completes treatment of Patient 2652 16:20:43 - Doctor 16 completes treatment of Patient 1833 16:10:46 - Doctor 7 completes treatment of Patient 1835 and is assigned to Patient 2630. 16:10:46 - Doctor 17 completes treatment of Patient 2686 and is assigned to Patient 2639. 16:10:49 - Doctor 15 completes treatment of Patient 2619 and is assigned to Patient 2614. 16:10:51 - Doctor 16 completes treatment of Patient 2602 and is assigned to Patient 2636. 16:10:55 - Doctor 6 completes treatment of Patient 1805 and is assigned to Patient 1836. 16:11:07 - Doctor 16 completes treatment of Patient 2636 and is assigned to Patient 2637. 16:11:11 - Doctor 4 completes treatment of Patient 2613 and is assigned to Patient 729. 16:11:27 - Doctor 3 completes treatment of Patient 2582 and is assigned to Patient 2640. 16:11:28 - Doctor 14 completes treatment of Patient 1178 and is assigned to Patient 2648. 16:11:30 - Doctor 5 completes treatment of Patient 2625 and is assigned to Patient 1812. 16:11:42 - Doctor 10 completes treatment of Patient 2624 and is assigned to Patient 1814. 16:11:45 - Doctor 5 completes treatment of Patient 1812 and is assigned to Patient 2641. 16:12:12 - Doctor 13 completes treatment of Patient 2524 and is assigned to Patient 1818. 16:12:30 - Doctor 8 completes treatment of Patient 2618 and is assigned to Patient 2652. </pre>	Pass/Fail
5	Event Class-Doctor Assignment to New Patient Upon Arrival	A patient arrives when a doctor is available. Verify that the ARRIVAL event results in immediate doctor assignment.	Patient is immediately assigned to a doctor	<pre> 16:10:46 - Doctor 7 completes treatment of Patient 1835 and is assigned to Patient 2630. 16:10:46 - Doctor 17 completes treatment of Patient 2686 and is assigned to Patient 2639. 16:10:49 - Doctor 15 completes treatment of Patient 2619 and is assigned to Patient 2614. 16:10:51 - Doctor 16 completes treatment of Patient 2602 and is assigned to Patient 2636. 16:10:55 - Doctor 6 completes treatment of Patient 1805 and is assigned to Patient 1836. 16:11:07 - Doctor 16 completes treatment of Patient 2636 and is assigned to Patient 2637. 16:11:11 - Doctor 4 completes treatment of Patient 2613 and is assigned to Patient 729. 16:11:27 - Doctor 3 completes treatment of Patient 2582 and is assigned to Patient 2640. 16:11:28 - Doctor 14 completes treatment of Patient 1178 and is assigned to Patient 2648. 16:11:30 - Doctor 5 completes treatment of Patient 2625 and is assigned to Patient 1812. 16:11:42 - Doctor 10 completes treatment of Patient 2624 and is assigned to Patient 1814. 16:11:45 - Doctor 5 completes treatment of Patient 1812 and is assigned to Patient 2641. 16:12:12 - Doctor 13 completes treatment of Patient 2524 and is assigned to Patient 1818. 16:12:30 - Doctor 8 completes treatment of Patient 2618 and is assigned to Patient 2652. </pre>	Pass/Fail

6	Doctor Assignment to New Patient With Waiting Queue	A patient arrives when no doctor is available. Check if the patient is correctly queued in the absence of an available doctor.	Patient is placed into the appropriate waiting queue based on their emergency level	<p>14:04:07 - Patient 2287 (1) arrives and is seated in the waiting room.</p> <p>14:04:17 - Doctor 16 completes treatment of Patient 2254 and is assigned to Patient 1479.</p> <p>14:04:18 - Doctor 4 completes treatment of Patient 2180 and is assigned to Patient 1483.</p> <p>14:04:31 - Patient 2283 (1) arrives and is seated in the waiting room.</p> <p>14:04:32 - Patient 2265 (1) arrives and is seated in the waiting room.</p> <p>14:04:41 - Patient 2288 (1) arrives and is seated in the waiting room.</p> <p>14:04:45 - Patient 2293 (1) arrives and is seated in the waiting room.</p> <p>14:04:53 - Patient 2289 (2) arrives and is assigned to Doctor 4, pre-empting Patient 1483 (1).</p> <p>14:05:07 - Patient 2292 (2) arrives and is assigned to Doctor 16, pre-empting Patient 1479 (1).</p> <p>14:05:18 - Doctor 1 completes treatment of Patient 2281 and is assigned to Patient 1486.</p> <p>14:05:26 - Patient 2295 (2) arrives and is assigned to Doctor 1, pre-empting Patient 1486 (1).</p> <p>14:05:38 - Patient 2296 (2) arrives and is seated in the waiting room.</p> <p>14:06:11 - Patient 2271 (3) arrives and is assigned to Doctor 1, pre-empting Patient 2295 (2).</p>	Pass/ Fail
7	Pre-emption Logic Check	Verify that the pre-emption logic correctly adjusts the Priority Queue and assigns the higher priority patient to a doctor. Input: A higher emergency level patient arrives when all doctors are busy with lower emergency level patients	Lower emergency level patient is pre-empted, and the higher emergency patient is given immediate treatment	<p>14:04:53 - Patient 2289 (2) arrives and is assigned to Doctor 4, pre-empting Patient 1483 (1).</p> <p>14:05:07 - Patient 2292 (2) arrives and is assigned to Doctor 16, pre-empting Patient 1479 (1).</p> <p>14:05:18 - Doctor 1 completes treatment of Patient 2281 and is assigned to Patient 1486.</p> <p>14:05:26 - Patient 2295 (2) arrives and is assigned to Doctor 1, pre-empting Patient 1486 (1).</p> <p>14:05:38 - Patient 2296 (2) arrives and is seated in the waiting room.</p>	Pass/ Fail
8	Treatment Time Adjustment Post Pre-emption	Check if the pre-empted patient's DEPARTURE event is accurately modified to reflect the new remaining treatment time. Input: Pre-emption of an ongoing treatment event	The remaining treatment time of the pre-empted patient is updated correctly	<p>14:30:07 - Patient 2529 (2) arrives and is seated in the waiting room.</p> <p>14:30:10 - Patient 2517 (2) arrives and is assigned to Doctor 8, pre-empting Patient 1231 (1).</p> <p>14:30:15 - Patient 2529 (1) arrives and is seated in the waiting room.</p> <p>14:30:15 - Patient 2502 (1) arrives and is seated in the waiting room.</p> <p>14:30:26 - Patient 2534 (1) arrives and is seated in the waiting room.</p> <p>14:30:33 - Patient 2521 (1) arrives and is seated in the waiting room.</p> <p>14:30:37 - Patient 2535 (1) arrives and is seated in the waiting room.</p> <p>14:30:42 - Patient 2533 (1) arrives and is seated in the waiting room.</p>	Pass/ Fail
9	Patients Arriving at Closing Time	Confirm that the cut off time is inclusive for patient arrivals. Input: Patients arriving at exactly 15:00	They should be seen by a doctor, not turned away	<p>11/12/2023 3:02:54 PM - Doctor 4 completes treatment of Patient 2633 and is assigned to Patient 1733.</p> <p>11/12/2023 3:02:59 PM - Patient 2728 (2) arrives after operating hours and is transferred.</p> <p>11/12/2023 3:03:34 PM - Patient 2716 (3) arrives after operating hours and is transferred.</p> <p>11/12/2023 3:03:38 PM - Doctor 6 completes treatment of Patient 1744 and is assigned to Patient 1751.</p> <p>11/12/2023 3:03:39 PM - Doctor 9 completes treatment of Patient 1710 and is assigned to Patient 1738.</p> <p>11/12/2023 3:03:53 PM - Patient 2688 (1) arrives after operating hours and is transferred.</p> <p>11/12/2023 3:04:07 PM - Doctor 1 completes treatment of Patient 1732 and is assigned to Patient 1756.</p> <p>11/12/2023 3:04:16 PM - Patient 2708 (1) arrives after operating hours and is transferred.</p>	Pass/ Fail
10	Patients Arriving After Closing Time	Make sure no ARRIVAL events are processed post-closing and the patients are handled accordingly. A patient arrives post 15:00	The patient should be turned away (simulated transfer to another hospital)	<p>11/12/2023 2:59:18 PM - Patient 2718 (1) arrives and is seated in the waiting room.</p> <p>11/12/2023 2:59:26 PM - Patient 2722 (2) arrives and is seated in the waiting room.</p> <p>11/12/2023 2:59:38 PM - Patient 2710 (1) arrives and is seated in the waiting room.</p> <p>11/12/2023 2:59:40 PM - Patient 2707 (1) arrives and is seated in the waiting room.</p> <p>11/12/2023 2:59:45 PM - Patient 2715 (1) arrives and is seated in the waiting room.</p> <p>11/12/2023 2:59:45 PM - Patient 2719 (1) arrives and is seated in the waiting room.</p> <p>11/12/2023 2:59:51 PM - Doctor 6 completes treatment of Patient 1718 and is assigned to Patient 1610.</p> <p>11/12/2023 2:59:54 PM - Doctor 18 completes treatment of Patient 2691 and is assigned to Patient 1717.</p> <p>11/12/2023 2:59:56 PM - Doctor 3 completes treatment of Patient 2647 and is assigned to Patient 779.</p> <p>11/12/2023 3:00:01 PM - Patient 2713 (3) arrives after operating hours and is transferred.</p> <p>11/12/2023 3:00:03 PM - Patient 2714 (1) arrives after operating hours and is transferred.</p> <p>11/12/2023 3:00:06 PM - Patient 2725 (1) arrives after operating hours and is transferred.</p> <p>11/12/2023 3:00:07 PM - Doctor 6 completes treatment of Patient 1610 and is assigned to Patient 1722.</p>	Pass/ Fail
11	Calculating Average Waiting Times for Patients	Make sure to print the average waiting times for patients according to their emergency level.	The program should print 3 separate sections (emergency level) for average waiting times.	<p>Average Waiting Times:</p> <p>Level 1: 439153882.6575985 seconds</p> <p>Level 2: 4415431430.425201 seconds</p> <p>Level 3: 298306948.2429907 seconds</p>	Pass/ Fail