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Course: CNT 4714 Spring 2024

Assignment title: Project 2 – Synchronized, Cooperating Threads Under Locking

Due Date: February 11, 2024

### Output from the program:

* * * SIMULATION BEGINS...				until a depositor thread runs.	
Deposit Agents	Withdrawal Agents	Balance	Transaction Number		
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Agent DT1 deposits \$44	Agent WT7 withdraws \$91	(***** WITHDRAWAL BLOCKED - INSUFICIENT FUNDS!!!	1		
	Agent WT5 withdraws \$78	(***** WITHDRAWAL BLOCKED - INSUFICIENT FUNDS!!!			
	Agent WT6 withdraws \$61	(***** WITHDRAWAL BLOCKED - INSUFICIENT FUNDS!!!			
	Agent WT3 withdraws \$74	(***** WITHDRAWAL BLOCKED - INSUFICIENT FUNDS!!!			
Agent DT4 deposits \$139	(+) Balance is \$44.	(***** WITHDRAWAL BLOCKED - INSUFICIENT FUNDS!!!	2		
	Agent WT4 withdraws \$77	(-) Balance is \$22.	3		
	Agent WT10 withdraws \$19	(-) Balance is \$3.	4		
	Agent WT9 withdraws \$60	(***** WITHDRAWAL BLOCKED - INSUFICIENT FUNDS!!!	5		
	Agent WT5 withdraws \$48	(***** WITHDRAWAL BLOCKED - INSUFICIENT FUNDS!!!	6		
Agent DT3 deposits \$93	(+) Balance is \$142.	(-) Balance is \$100.	7		
	Agent WT10 withdraws \$42	(-) Balance is \$21.	8		
	Agent WT10 withdraws \$79	(-) Balance is \$21.	9		
***Flagged Transaction - Withdrawal Agent WT10 Made A Withdrawal In Excess Of \$75.00 USD - See Flaged Transaction Log.					
Agent DT3 deposits \$93	Agent WT8 withdraws \$76	(***** WITHDRAWAL BLOCKED - INSUFICIENT FUNDS!!!	10		
	Agent WT4 withdraws \$34	(***** WITHDRAWAL BLOCKED - INSUFICIENT FUNDS!!!	11		
	Agent WT2 withdraws \$22	(***** WITHDRAWAL BLOCKED - INSUFICIENT FUNDS!!!	12		
	(+) Balance is \$114.	(-) Balance is \$68.	13		
	Agent WT4 withdraws \$46	(-) Balance is \$54.	14		
	Agent WT1 withdraws \$14	(-) Balance is \$25.	15		
	Agent WT7 withdraws \$29	(***** WITHDRAWAL BLOCKED - INSUFICIENT FUNDS!!!	16		
	Agent WT5 withdraws \$70	(***** WITHDRAWAL BLOCKED - INSUFICIENT FUNDS!!!	17		
	Agent WT2 withdraws \$98	(***** WITHDRAWAL BLOCKED - INSUFICIENT FUNDS!!!	18		
	Agent WT10 withdraws \$51	(***** WITHDRAWAL BLOCKED - INSUFICIENT FUNDS!!!	19		
	Agent WT7 withdraws \$61	(***** WITHDRAWAL BLOCKED - INSUFICIENT FUNDS!!!	20		
	Agent WT4 withdraws \$41	(***** WITHDRAWAL BLOCKED - INSUFICIENT FUNDS!!!	21		
	Agent WT3 withdraws \$50	(***** WITHDRAWAL BLOCKED - INSUFICIENT FUNDS!!!	22		
	Agent WT4 withdraws \$88	(***** WITHDRAWAL BLOCKED - INSUFICIENT FUNDS!!!	23		
	Agent WT10 withdraws \$37	(***** WITHDRAWAL BLOCKED - INSUFICIENT FUNDS!!!	24		
	Agent WT6 withdraws \$93	(***** WITHDRAWAL BLOCKED - INSUFICIENT FUNDS!!!	25		
	Agent WT9 withdraws \$43	(***** WITHDRAWAL BLOCKED - INSUFICIENT FUNDS!!!	26		
	Agent WT5 withdraws \$91	(***** WITHDRAWAL BLOCKED - INSUFICIENT FUNDS!!!	27		
	Agent WT6 withdraws \$8	(-) Balance is \$17.	28		
	Agent WT7 withdraws \$56	(***** WITHDRAWAL BLOCKED - INSUFICIENT FUNDS!!!	29		
	Agent WT8 withdraws \$79	(***** WITHDRAWAL BLOCKED - INSUFICIENT FUNDS!!!	30		
	Agent DT4 deposits \$78	(+) Balance is \$95.	31		
	Agent DT1 deposits \$249	(-) Balance is \$42.	32		
(+) Balance is \$291.		33			
Agent DT5 deposits \$276	(-) Balance is \$262.	34			
	(+) Balance is \$538.	35			
Agent DT2 deposits \$340	(+) Balance is \$878.	36			
	(-) Balance is \$829.	37			
	Agent WT1 withdraws \$49	(-) Balance is \$761.	38		
	Agent WT7 withdraws \$68	(-) Balance is \$664.	39		
	Agent WT4 withdraws \$97	(-) Balance is \$664.	40		
***Flagged Transaction - Withdrawal Agent WT4 Made A Withdrawal In Excess Of \$75.00 USD - See Flaged Transaction Log.					
	Agent WT2 withdraws \$92	(-) Balance is \$572.	41		
***Flagged Transaction - Withdrawal Agent WT2 Made A Withdrawal In Excess Of \$75.00 USD - See Flaged Transaction Log.					
Agent DT4 deposits \$463	(+) Balance is \$1035.	42			
***Flagged Transaction - Depositor Agent DT4 Made A Deposit In Excess Of \$350.00 USD - See Flaged Transaction Log.					

The Internal Bank Auditor agent example:

INTERNAL BANK AUDITOR FINDS CURRENT ACCOUNT BALANCE TO BE: \$1035

Number of transactions since last Internal audit is: 22

Agent DT1 deposits \$214

Agent WT3 withdraws \$25

(-) Balance is \$1010.

23

Agent WT8 withdraws \$7

(-) Balance is \$1003.

24

Agent WT10 withdraws \$71

(-) Balance is \$932.

25

Agent WT9 withdraws \$34

(-) Balance is \$898.

26

(+) Balance is \$1112.

27

Agent WT10 withdraws \$78

(-) Balance is \$1034.

28

\*\*\*Flagged Transaction - Withdrawal Agent WT10 Made A Withdrawal In Excess Of \$75.00 USD - See Flaged Transaction Log.

INTERNAL BANK AUDITOR FINDS CURRENT ACCOUNT BALANCE TO BE: \$456

Number of transactions since last Internal audit is: 50

Agent DT1 deposits \$57

(+) Balance is \$513.

73

Agent DT2 deposits \$400

(+) Balance is \$913.

74

\*\*\*Flagged Transaction - Depositor Agent DT2 Made A Deposit In Excess Of \$350.00 USD - See Flaged Transaction Log.

Agent DT3 deposits \$191

Agent WT10 withdraws \$63

(-) Balance is \$850.

75

Agent WT9 withdraws \$6

(-) Balance is \$844.

76

Agent WT3 withdraws \$27

(-) Balance is \$817.

77

Agent WT9 withdraws \$69

(-) Balance is \$748.

78

(+) Balance is \$939.

79

Agent WT4 withdraws \$59

(-) Balance is \$880.

80

Agent WT6 withdraws \$17

(-) Balance is \$863.

81

Agent WT4 withdraws \$17

(-) Balance is \$846.

82

INTERNAL BANK AUDITOR FINDS CURRENT ACCOUNT BALANCE TO BE: \$846

Number of transactions since last Internal audit is: 10

The Treasury Dept Auditor agent example:

TREASURY DEPT AUDITOR FINDS CURRENT ACCOUNT BALANCE TO BE: \$427					Number of transactions since last Treasury audit is: 55	
Agent DT5 deposits \$254		Agent WT1 withdraws \$74	(-) Balance is \$353.	56		
		Agent WT10 withdraws \$28	(-) Balance is \$325.	57		
			(+) Balance is \$579.	58		
		Agent WT2 withdraws \$17	(-) Balance is \$562.	59		
Agent DT4 deposits \$484		Agent WT6 withdraws \$30	(-) Balance is \$532.	60		
			(+) Balance is \$1016.	61		
***Flagged Transaction - Depositor Agent DT4 Made A Deposit In Excess Of \$350.00 USD - See Flaged Transaction Log.						
TREASURY DEPT AUDITOR FINDS CURRENT ACCOUNT BALANCE TO BE: \$4514					Number of transactions since last Treasury audit is: 166	
Agent DT1 deposits \$142			(+) Balance is \$4656.	222		
		Agent WT10 withdraws \$98	(-) Balance is \$4558.	223		
***Flagged Transaction - Withdrawal Agent WT10 Made A Withdrawal In Excess Of \$75.00 USD - See Flaged Transaction Log.						
		Agent WT3 withdraws \$83	(-) Balance is \$4475.	224		
***Flagged Transaction - Withdrawal Agent WT3 Made A Withdrawal In Excess Of \$75.00 USD - See Flaged Transaction Log.						

## The transaction log file (transactions.csv):

```
Withdrawal Agent WT10 issued withdrawal of $79.00 at: 11/02/2024 23:33:16 EST Transaction Number : 6
Withdrawal Agent WT4 issued withdrawal of $97.00 at: 11/02/2024 23:33:17 EST Transaction Number : 20
Withdrawal Agent WT2 issued withdrawal of $92.00 at: 11/02/2024 23:33:17 EST Transaction Number : 21
Depositor Agent DT4 issued deposit of $463.00 at: 11/02/2024 23:33:17 EST Transaction Number : 22
Withdrawal Agent WT10 issued withdrawal of $78.00 at: 11/02/2024 23:33:18 EST Transaction Number : 28
Withdrawal Agent WT3 issued withdrawal of $87.00 at: 11/02/2024 23:33:18 EST Transaction Number : 30
Withdrawal Agent WT5 issued withdrawal of $95.00 at: 11/02/2024 23:33:18 EST Transaction Number : 31
Withdrawal Agent WT4 issued withdrawal of $88.00 at: 11/02/2024 23:33:18 EST Transaction Number : 43
Withdrawal Agent WT2 issued withdrawal of $78.00 at: 11/02/2024 23:33:19 EST Transaction Number : 53
Withdrawal Agent WT1 issued withdrawal of $99.00 at: 11/02/2024 23:33:19 EST Transaction Number : 55
Depositor Agent DT4 issued deposit of $484.00 at: 11/02/2024 23:33:19 EST Transaction Number : 61
Withdrawal Agent WT3 issued withdrawal of $85.00 at: 11/02/2024 23RD 3M 2ND action Number : 66
Withdrawal Agent WT5 issued withdrawal of $91.00 at: 11/02/2024 23:33:19 EST Transaction Number : 68
Withdrawal Agent WT1 issued withdrawal of $89.00 at: 11/02/2024 23:33:19 EST Transaction Number : 70
Depositor Agent DT2 issued deposit of $400.00 at: 11/02/2024 23:33:19 EST Transaction Number : 74
Withdrawal Agent WT7 issued withdrawal of $83.00 at: 11/02/2024 23:33:20 EST Transaction Number : 83
Depositor Agent DT4 issued deposit of $433.00 at: 11/02/2024 23:33:20 EST Transaction Number : 85
Depositor Agent DT4 issued deposit of $452.00 at: 11/02/2024 23:33:20 EST Transaction Number : 93
Withdrawal Agent WT6 issued withdrawal of $84.00 at: 11/02/2024 23:33:20 EST Transaction Number : 94
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