ATM Withdrawal, Deposit and Transfer Transactions
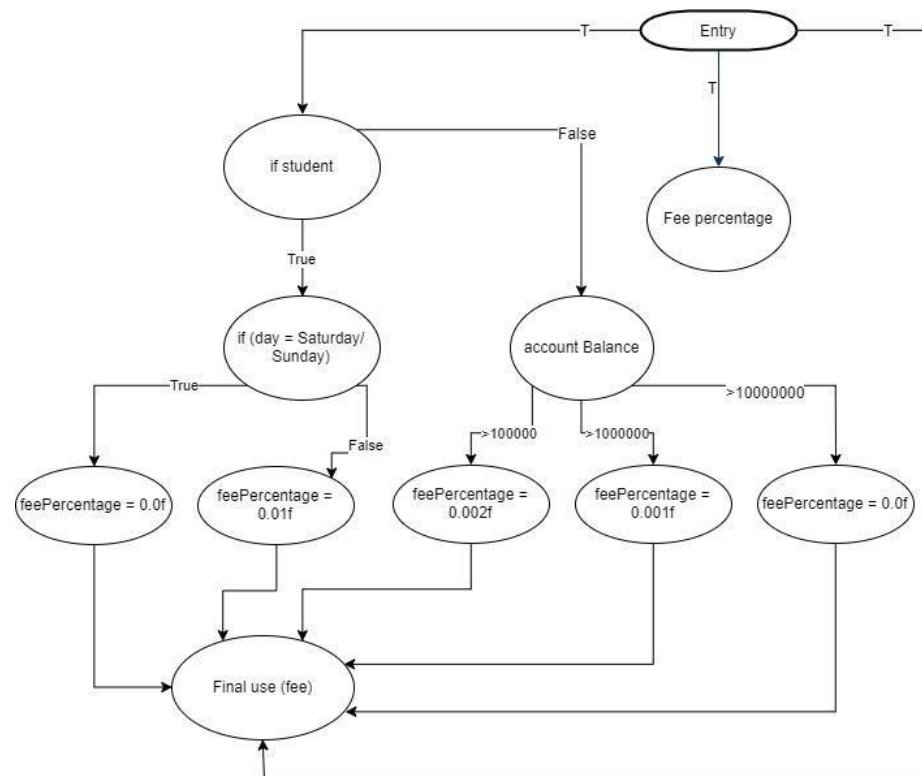# White Box testing

TEST SCENARIO: TS-001

BUSINESS SCENARIO:	Withdrawal Transaction
TESTER	Group 12 (Aasminpreet Singh Kainth; Ria Ria; Sai Lakshmi Pravallika Samayamanthula; Vishwa Sai Kodiyala)
DESCRIPTION:	Computing the Slice and developing the test cases based on Statement Coverage

Steps Followed are the following:

Step 1 -> Computing the slice: The program is sliced based on the slice criterion Final Use (fee) i.e., return fee
Program Dependency Graph (PDG) for computed slice:

Step 2 -> Statement Coverage: Developing the test cases for performing the statement coverage on the computed slice.

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TEST CASES:

CASE ID	TEST CONDITIONS	INPUT DATA / SPL. INFORMATION	EXPECTED RESULT	ACTUAL RESULT	Pass / Fail
1.	Checking whether the client is a student and the day is Saturday	Client: Student Day: Weekend (7) i.e., Saturday	No fee	No fee	Pass
2.	Checking whether the client is a student and the day is Sunday	Client: Student Day: Weekend (1) i.e., Sunday	No fee	No fee	Pass
3.	Checking whether the client is student and day is weekday	Client: Student Day: Weekday (2)	Fee is 0.1% of the amount withdrawn	Fee is 0.1% of the amount withdrawn	Pass
4.	Checking whether the client is not a student and the account balance is less than 100000	Client: Not a student Day: Weekday (2) Account balance: 99995	Fee is 0.2% of the amount withdrawn	Fee is 0.2% of the amount withdrawn	Pass
5.	Checking whether the client is not a student and the account balance is less than 1000000	Client: Not a student Day: Weekday (2) Account balance: 999955	Fee is 0.1% of the amount withdrawn	Fee is 0.1% of the amount withdrawn	Pass
6.	Checking whether the client is not a student and the account balance is greater than 1000000	Client: Not a student Day: Weekday (2) Account Balance: 1000001	No fee	No fee	Pass

COMMENTS

## TEST SCENARIO: TS-002

BUSINESS SCENARIO:	Deposit Transaction
TESTER	Group 12 (Aasminpreet Singh Kainth; Ria Ria; Sai Lakshmi Pravallika Samayamanthula; Vishwa Sai Kodiyala)
DESCRIPTION:	Process of depositing money into an account using ATM

Code Snippet: Calculate Deposit Interest

```
33   public int calculateDepositInterest(int amount, int accountBalance, boolean student) {
34       // Calculate interest percentage
35       float interestPercentage;
36       // Check if student
37       if (student) {
38           // Check amount deposited
39           if (amount > 10000) {
40               // Check balance
41               if (accountBalance > 100000) {
42                   interestPercentage = 0.01f;
43               } else {
44                   interestPercentage = 0.005f;
45               }
46           } else {
47               if (accountBalance > 500000) {
48                   interestPercentage = 0.005f;
49               } else {
50                   interestPercentage = 0.002f;
51               }
52           }
53       } else {
54           if (amount > 50000) {
55               if (accountBalance > 500000) {
56                   interestPercentage = 0.01f;
57               } else {
58                   interestPercentage = 0.005f;
59               }
60           } else {
61               if (accountBalance > 1000000) {
62                   interestPercentage = 0.005f;
63               } else {
64                   interestPercentage = 0.0f;
65               }
66           }
67       }
68
69       // Calculate interest
70       int interest = Math.round(amount * interestPercentage);
71
72       return interest;
73   }
```

Control Flow Graph for Deposit transaction:
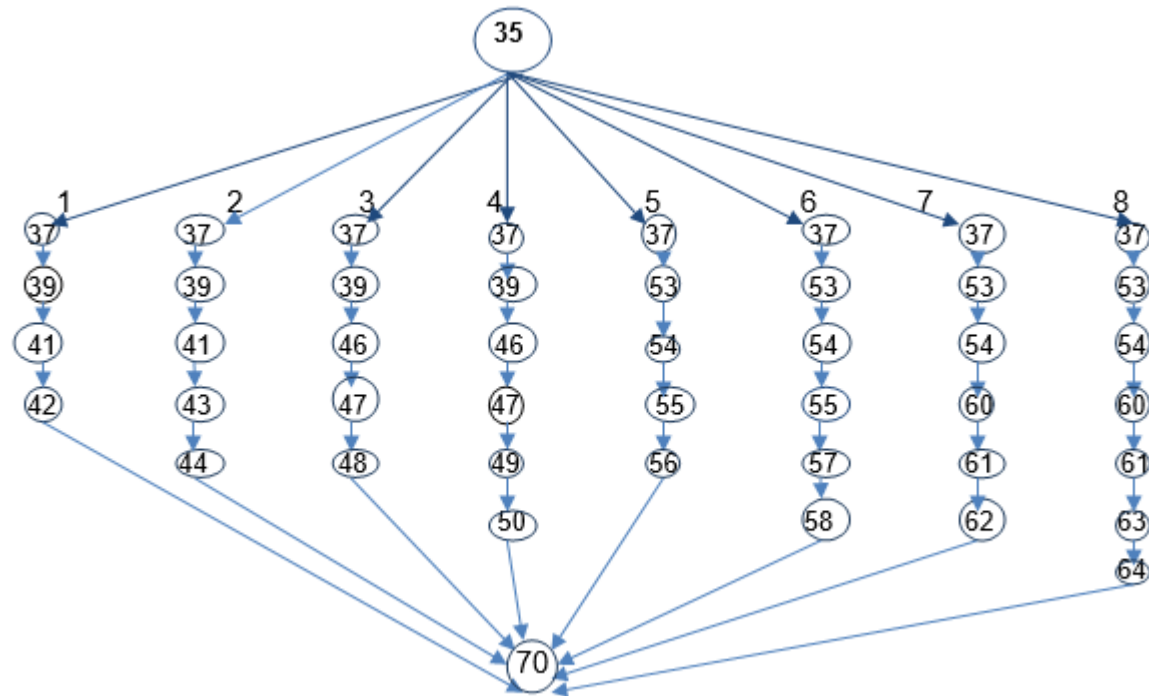
Define/Use Nodes for 'interestPercentage' in deposit transaction:

Variable	Defined at Node	Used at Node
interestPercentage	42, 44, 48, 50, 56, 58, 62, 64	70

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Selected Define/Use paths:

Variable	Path (Beginning, End) Nodes	Definition Clear?
interestPercentage	(42,70)	Yes
interestPercentage	(44,70)	Yes
interestPercentage	(48,70)	Yes
interestPercentage	(50,70)	Yes
interestPercentage	(56,70)	Yes
interestPercentage	(58,70)	Yes
interestPercentage	(62,70)	Yes
interestPercentage	(64,70)	Yes

DU paths for 'interestPercentage':

P1	P2	P3	P4	P5	P6	P7	P8
42	44	48	50	56	58	62	64
70	70	70	70	70	70	70	70

ASSUMPTIONS:

1. The maximum amount that can be deposited is $1000000 per transaction.
2. The minimum amount that can be deposited is $0 per transaction.
3. Negative amount cannot be deposited.
4. The minimum possible account balance is $0.
5. There is no maximum limit for account balance.
6. Appropriate exceptions are thrown for illegal arguments.

PROCESS FLOW:

1. Specifying the input for deposit amount and account balance.
2. Calculating the expected fee for deposit amount based on the specification.
3. Checking if the expected fee is equal to the observed fee calculated by the program.

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TEST CASES:

CASE ID	TEST CONDITION	INPUT DATA (Amount in cents)	EXPECTED RESULT	ACTUAL RESULT	PASS/FAIL
1.	DU1 Client: Student, Amount Deposited: >$100 Account balance: >$1000	Student: True depositAmount: 100000 accountbalance: 200000	1% fee is charged on the amount deposited.	1% fee is charged on the amount deposited.	PASS
2.	DU2 Client: Student, Amount Deposited: >$100 Account balance: <=$1000	Student: True depositAmount: 80000 accountbalance: 90000	0.5% fee is charged on the amount deposited.	0.5% fee is charged on the amount deposited	PASS
3.	DU3 Client: Student, Amount Deposited: <=$100 Account balance: >$5000	Student: True depositAmount: 6000 accountbalance: 700000	0.5% fee is charged on the amount deposited.	0.5% fee is charged on the amount deposited.	PASS
4.	DU4 Client: Student, Amount Deposited: <=$100 Account balance: <=$5000	Student: True depositAmount: 4000 accountbalance: 300000	No fee is charged on the amount deposited.	0.2% fee is charged on the amount deposited.	FAIL
5	DU5 Client: Not a Student, Amount Deposited: >$500 Account balance: >$5000	Student: False depositAmount: 70000 accountbalance: 800000	1% fee is charged on the amount deposited.	1% fee is charged on the amount deposited.	PASS
6	DU6 Client: Not a Student, Amount Deposited: >$500 Account balance: <=$5000	Student: False depositAmount: 90000 accountbalance: 300000	0.5% fee is charged on the amount deposited.	0.5% fee is charged on the amount deposited.	PASS

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CASE ID	TEST CONDITION	INPUT DATA (Amount in cents)	EXPECTED RESULT	ACTUAL RESULT	PASS/FAIL
7	DU7 Client: Not a Student, Amount Deposited: <=500 Account balance: >$10000	Student: False depositAmount: 40000 accountbalance: 1200000	0.5% fee is charged on the amount deposited.	0.5% fee is charged on the amount deposited.	PASS
8	DU8 Client: Not a Student, Amount Deposited: <=$500 Account balance: <=10000	Student: False depositAmount: 30000 accountbalance: 500000	No fee is charged on the amount deposited.	No fee is charged on the amount deposited.	PASS

COMMENTS

TEST SCENARIO: TS-003

BUSINESS SCENARIO:	Transfer Transaction
TESTER	Group 12 (Aasminpreet Singh Kainth; Ria Ria; Sai Lakshmi Pravallika Samayamanthula; Vishwa Sai Kodiyala)
DESCRIPTION:	Basis Path Testing

Basis Path Testing:

To compute the test cases with the help of Basis Path testing, we need to follow below steps:

Step-1: *Compute the program flow graph. For Transfer, below is the compute flow graph.*

Below are control flow graphs,

1st Control Flow Graph denotes when client is student.
2nd Control Flow Graph denotes when client is not student.

Step-2: *Compute Cyclomatic Complexity.*

In this case, it is 16. V(g) = Cycles + 1(Outer Region)

Step-3: *Select Basis set of paths from the control flow graph.*

We got 16 paths.

Step-4: *Generate test cases.*

For each path we got one test case. Thus, we have 16 test cases.

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79 Is Student?

True

80 Amount<10000

True — False

81 fromAccountBalance < 100000

95 fromAccountBalance < 100000

True — False

True — False

82 toAccountBalance < 100000

88 toAccountBalance < 100000

96 toAccountBalance < 100000

102 toAccountBalance < 100000

True — False

True — False

True — False

True — False

83 feePert 0.001

85 feePer 0.0005

89 feePert 0.005

91 feePer 0.0025

97 feePert 0.0005

99 feePert 0.00025

103 feePert 0.0025

105 feePert 0.00125

142 fee = Math.round(amount * feePercentage);
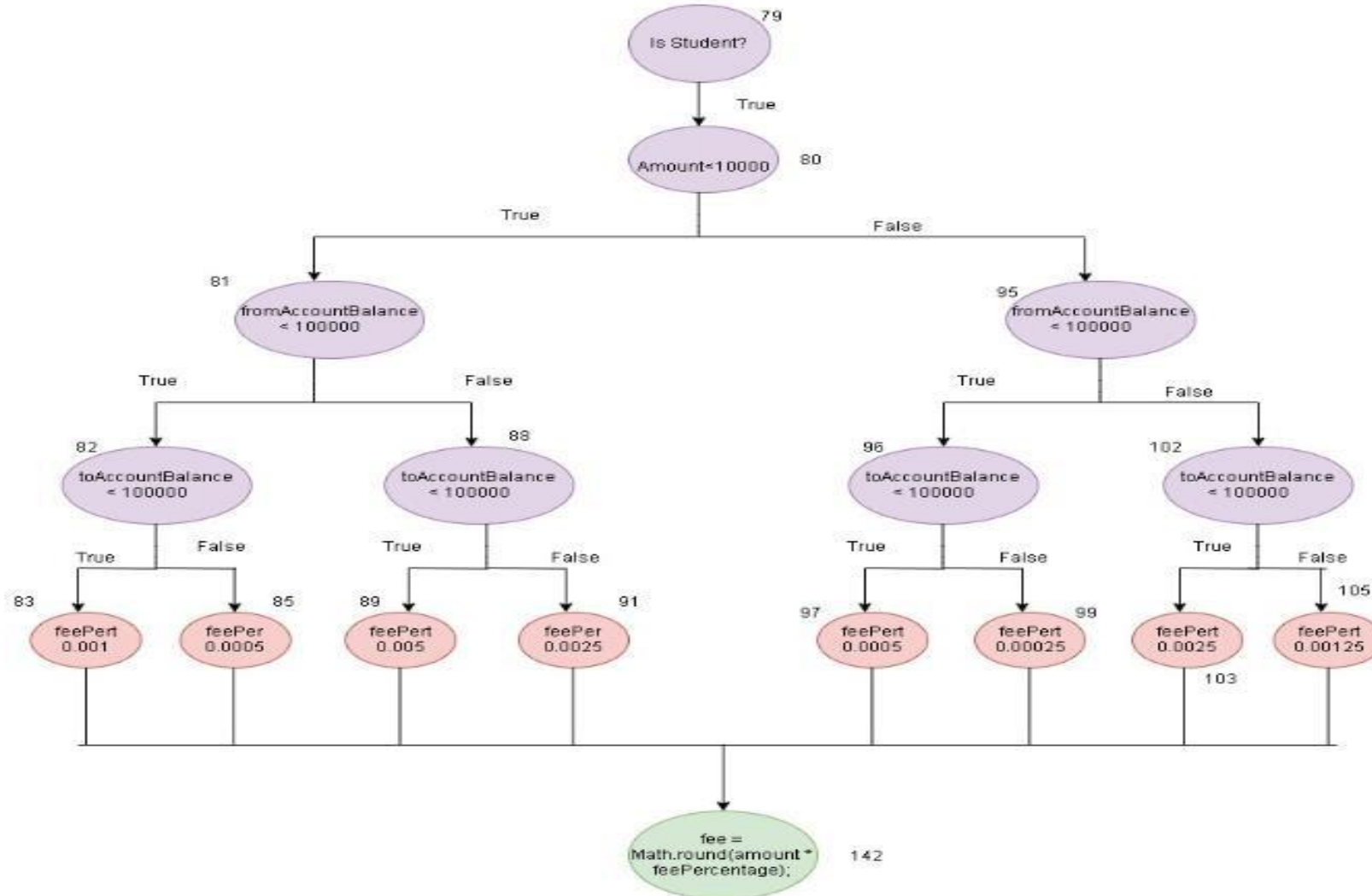
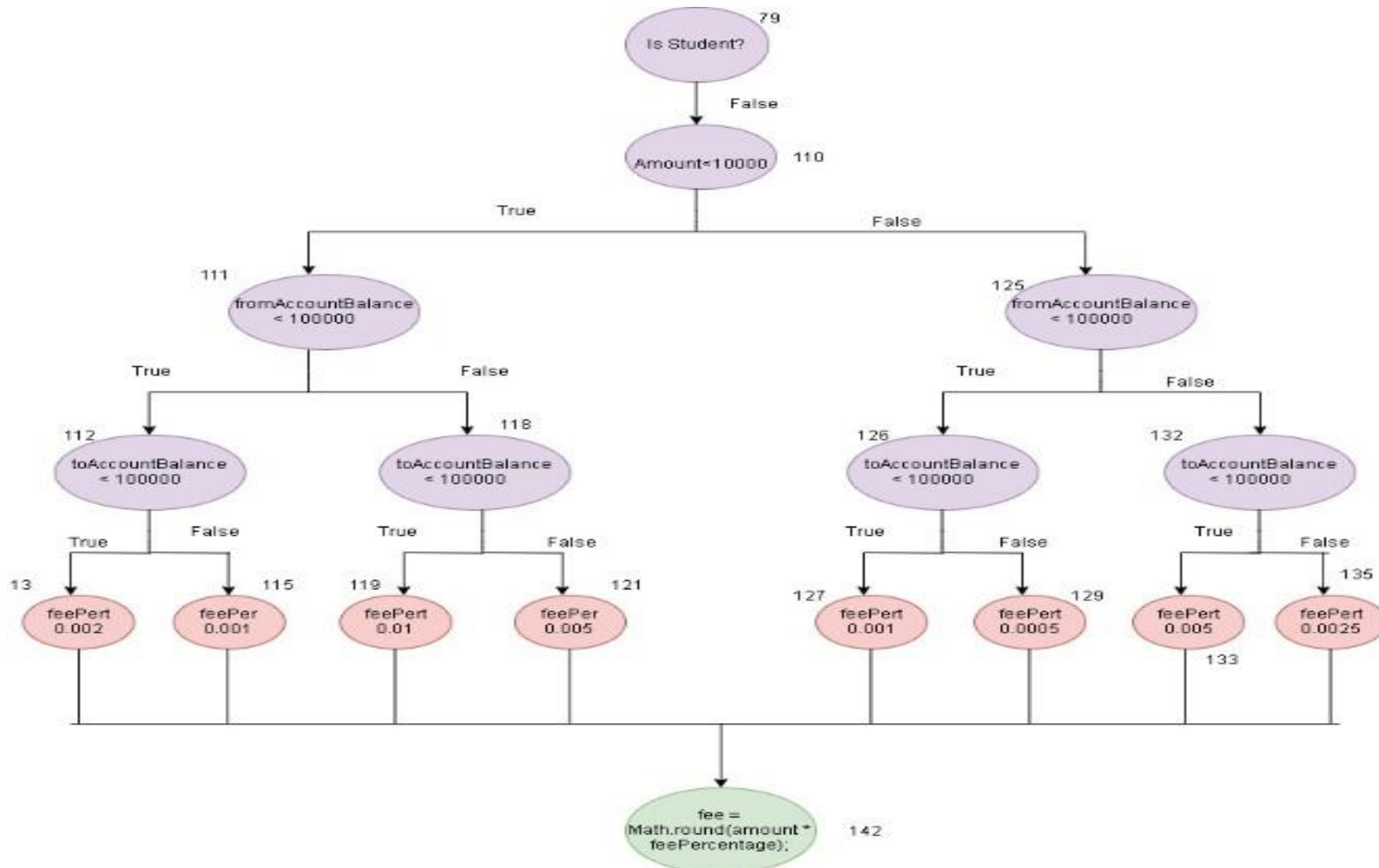# ATM Withdrawal, Deposit and Transfer Transactions
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TEST CASES:

CASE ID	TEST CONDITIONS	INPUT DATA / SPL. INFORMATION	EXPECTED RESULT	ACTUAL RESULT	Pass / Fail
1.	Basis Path(79->80❼95>102->105->142)	Client: Student Amount Deposited: 16000 From Account balance: 190000 To Account Balance: 170000	Fee is 0.00125 of the amount deposited.	Fee is 0.00125 of the amount deposited.	Pass
2.	Basis Path(79->80❼95>102->103->142)	Client: Student Amount Deposited: 16000 From Account balance: 190000 To Account Balance: 70000	Fee is 0.0025 of the amount deposited.	Fee is 0.0025 of the amount deposited.	Pass
3.	Basis Path(79->80❼95>96->99->142)	Client: Student Amount Deposited: 16000 From Account balance: 90000 To Account Balance: 170000	Fee is 0.00025 of the amount deposited.	Fee is 0.00025 of the amount deposited.	Pass
4.	Basis Path(79->80❼95>96->97->142)	Client: Student Amount Deposited: 16000 From Account balance: 90000 To Account Balance: 70000	Fee is 0.0005 of the amount deposited.	Fee is 0.0005 of the amount deposited.	Pass
5.	Basis Path(79->80>81->82->83)	Client: Student Amount Deposited: 6000 From Account balance: 90000 To Account Balance: 17000	Fee is 0.001 of the amount deposited.	Fee is 0.001 of the amount deposited.	Pass
6.	Basis Path(79->80>81->82->85)	Client: Student Amount Deposited: 6000 From Account balance: 90000 To Account Balance: 170000	Fee is 0.0005 of the amount deposited.	Fee is 0.0005 of the amount deposited.	Pass

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CASE ID	TEST CONDITIONS	INPUT DATA / SPL. INFORMATION	EXPECTED RESULT	ACTUAL RESULT	Pass / Fail
7.	Basis Path(79->80>81->88->89)	Client: Student Amount Deposited: 6000 From Account balance: 190000 To Account Balance: 17000	Fee is 0.005 of the amount deposited.	Fee is 0.005 of the amount deposited.	Pass
8.	Basis Path(79->80>81->88->91)	Client: Student Amount Deposited: 6000 From Account balance: 190000 To Account Balance: 170000	Fee is 0.0025 of the amount deposited.	Fee is 0.0025 of the amount deposited.	Pass
9.	Basis Path(79>110>111->112->113->142)	Client: Not Student Amount Deposited: 6000 From Account balance: 90000 To Account Balance: 17000	Fee is 0.002 of the amount deposited.	Fee is 0.002 of the amount deposited.	Pass
10.	Basis Path(79>110>111->112->115->142)	Client: Not Student Amount Deposited: 6000 From Account balance: 90000 To Account Balance: 170000	Fee is 0.001 of the amount deposited.	Fee is 0.001 of the amount deposited.	Pass
11.	Basis Path(79->110>111->118->119->142)	Client: Not Student Amount Deposited: 6000 From Account balance: 190000 To Account Balance: 17000	Fee is 0.01 of the amount deposited.	Fee is 0.01 of the amount deposited.	Pass
12.	Basis Path(79->110>111->118->121->142)	Client: Not Student Amount Deposited: 6000 From Account balance: 190000 To Account Balance: 170000	Fee is 0.005 of the amount deposited.	Fee is 0.005 of the amount deposited.	Pass
13.	Basis Path(79->110>125->132->135->142)	Client: Not Student Amount Deposited: 16000 From Account balance: 190000 To Account Balance: 170000	Fee is 0.0025 of the amount deposited.	Fee is 0.0025 of the amount deposited.	FAIL

CASE ID	TEST CONDITIONS	INPUT DATA / SPL. INFORMATION	EXPECTED RESULT	ACTUAL RESULT	Pass / Fail
14.	Basis Path(79->->110>125->132->133->142)	Client: Not Student Amount Deposited: 16000 From Account balance: 190000 To Account Balance: 70000	Fee is 0.005 of the amount deposited.	Fee is 0.005 of the amount deposited.	Pass
15.	Basis Path(79->->110>125->126->129->142)	Client: Not Student Amount Deposited: 16000 From Account balance: 90000 To Account Balance: 170000	Fee is 0.0005 of the amount deposited.	Fee is 0.0005 of the amount deposited.	Pass
16.	Basis Path(79->->110>125->126->127->142)	Client: Not Student Amount Deposited: 16000 From Account balance: 90000 To Account Balance: 70000	Fee is 0.001 of the amount deposited.	Fee is 0.001 of the amount deposited.	Pass

COMMENTS