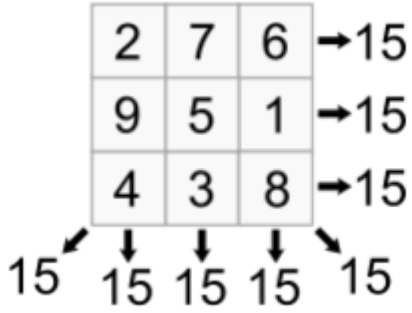
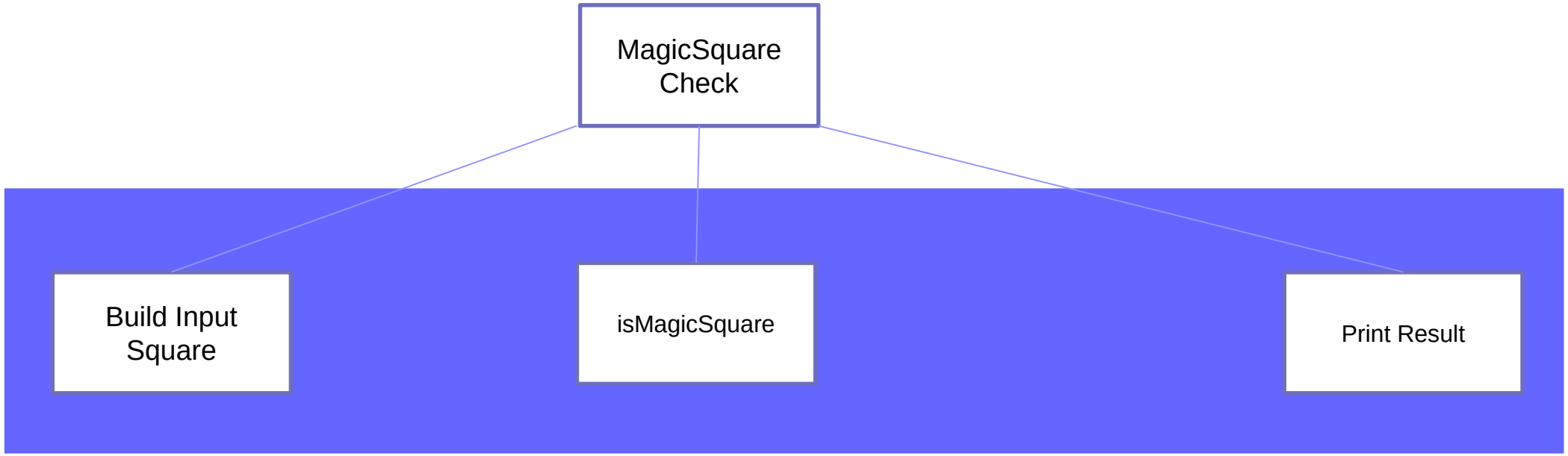
Lab 4 Discussion

Magic Square

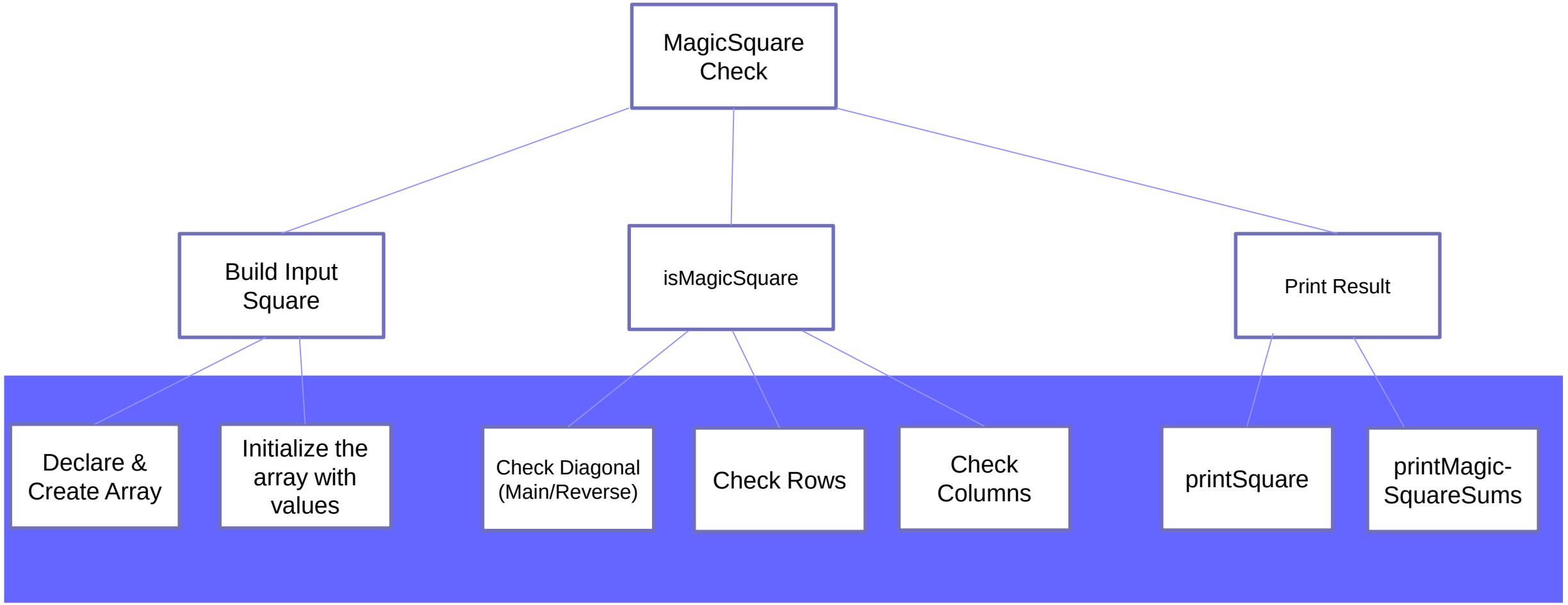


A magic square is a square matrix in which the sum of every row, every column, and both diagonals is the same.

Magic Square Validation – 1st and 2nd levels Refinements



Magic Square Validation – 1st, 2nd ,and 3rd levels refinements



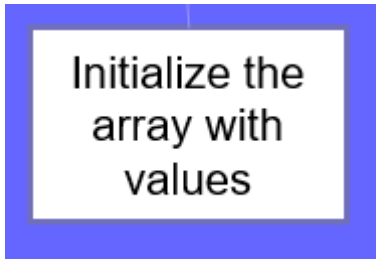
Declare and create an array

1. **`Read the array size from the file, size.`**
2. MagicSquare myMagicSquare = new MagicSquare(size);
   - square = new int[size][size];

   Where square is declare atop.

Note: Assume the scanner object is created from MagicSquareTest.java
Scanner scan = new Scanner(new File("magicText.txt")); // in MagicSquareTest

Initialize the array with values

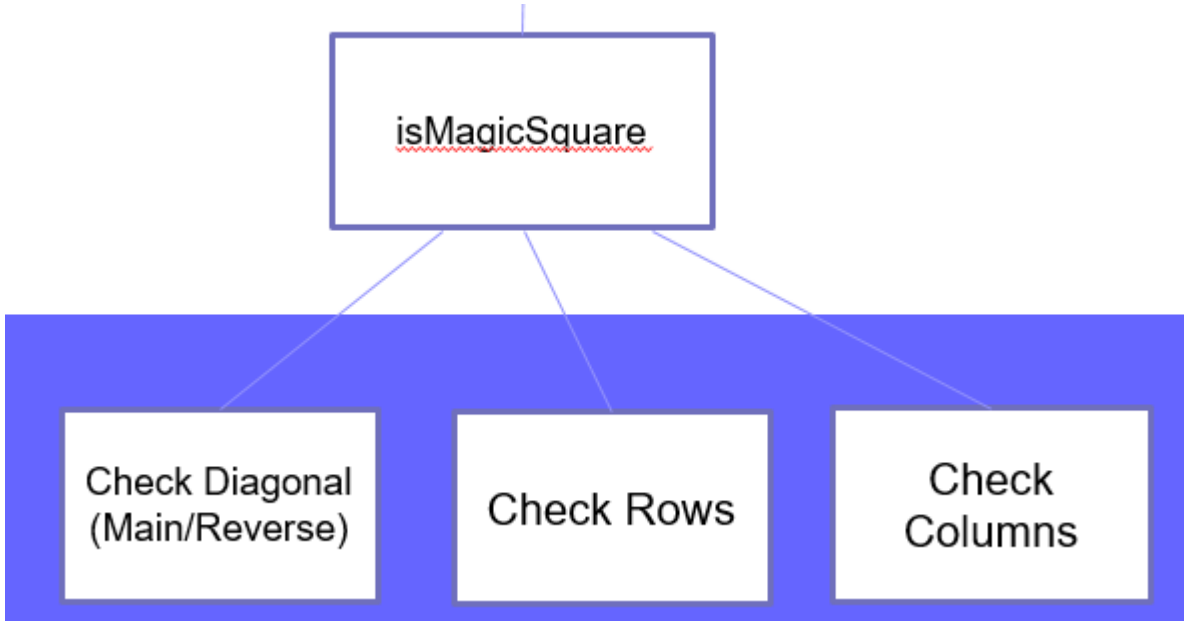



```
for each row
  for each column
     square[row][col] = scan.nextInt();
```

Note: scan is an object from:

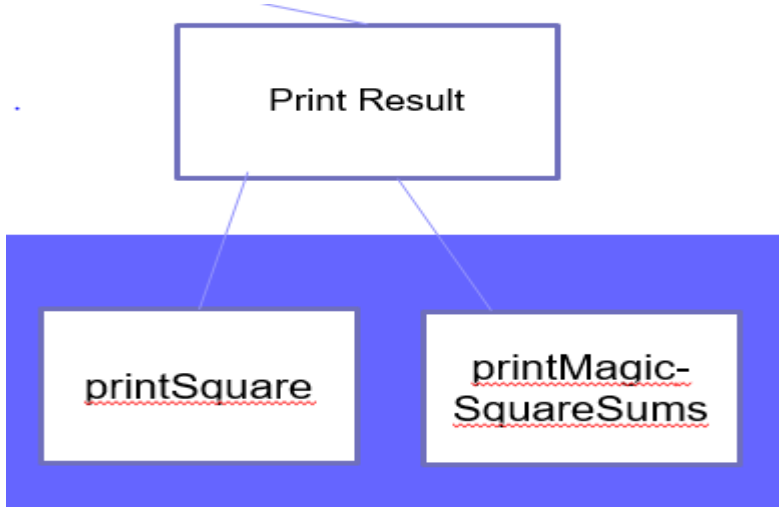
Scanner scan = new Scanner(new File("magicText.txt")); // in test Program

Validate MagicSquare



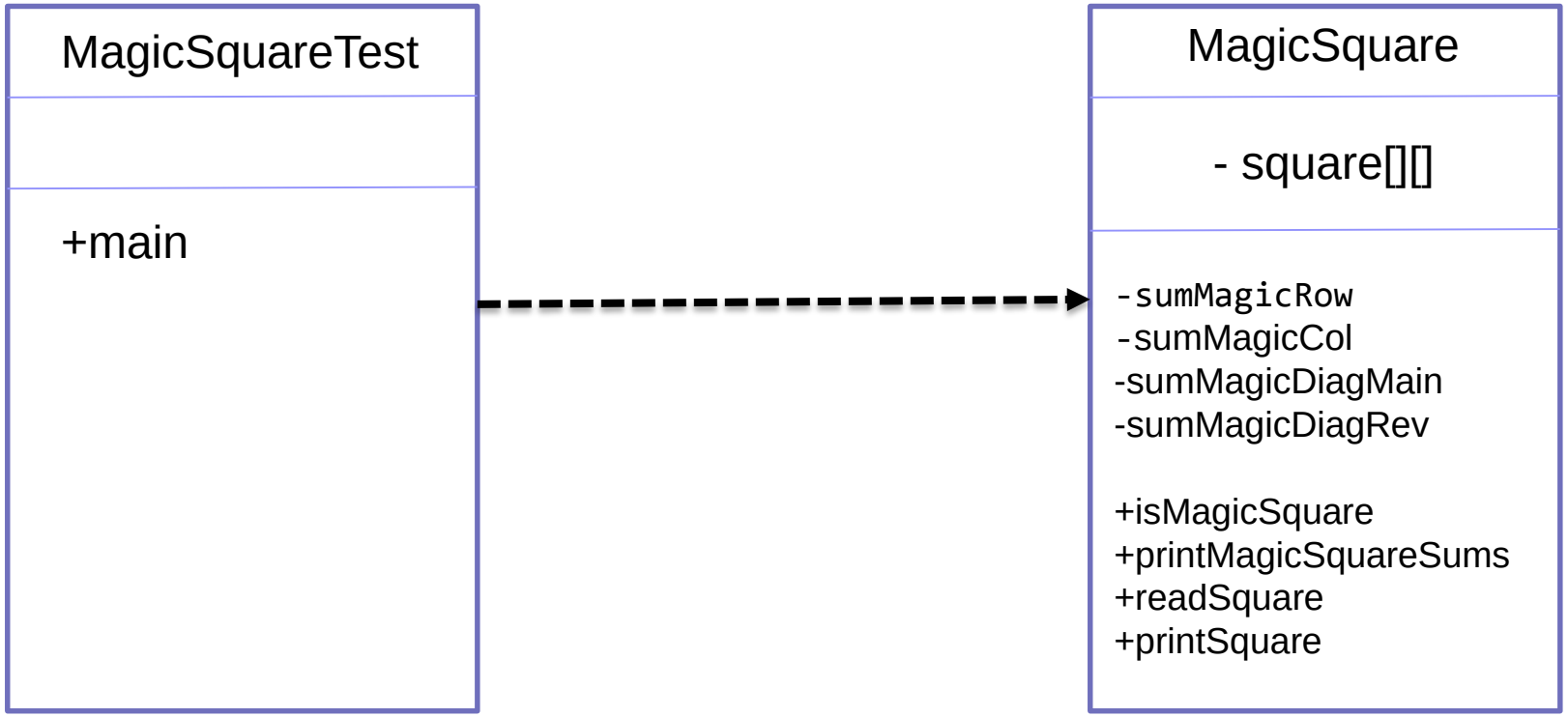
1) Get sum of Diagonal, sumDiagonal
2) Compare sumDiagonal with Reversed Diagonal Sum
3) Compare sumDiagonal with each row of Square
4) Compare sumDiagonal with each column of Square
5) Return status

Print Square



1. Print the square id (first square is assumed an id of 1, second of 2…)
2. Print the 2D array formatted neatly to the system output.
3. Print the sums of each row, column, and diagonal.
4. Print validation status (see previous slide)
5. Repeat until receiving a -1 (end of file)

Class Organization



Responsible: Initializations, creating object, invoking magic square checking

Responsible: Computing magic square functionalities

Sample input file

magicText.txt

```
3
8  1  6
3  5  7
4  9  2
7
30  39  48   1  10  19  28
38  47   7   9  18  27  29
46   6   8  17  26  35  37
5   14  16  25  34  36  45
13  15  24  33  42  44   4
21  23  32  41  43   3  12
22  31  40  49   2  11  20
```

Sample output file

```
----jGRASP exec: java MagicSquareTest

***** Square 1 *****
8 1 6
3 5 7
4 9 2
***** Square 1 *****

Sum of row 0 is: 15
Sum of row 1 is: 15
Sum of row 2 is: 15

Sum of column 0 is: 15
Sum of column 1 is: 15
Sum of column 2 is: 15

The sum of the main diagonal is: 15

The sum of the other diagonal is: 15

Is it a magic square: true
```

Sample code to compute sum for row

```
// Sample to compute sum for row
private int sumMagicRow(int row) {
    int sum = 0;
    for (int c = 0; c < square.length; c++) {
        sum += square[row][c];
    }
    return sum;
}
```