SIDDHARTH S

CH.SC.U4CSE24145

OBJECT ORIENTED PROGRAMMING (23CSE111)

LAB RECORD

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BONAFIDE CERTIFICATE

This is to certify that the Lab Record work for 23CSE111- Object Oriented Programming Subject submitted by ***CH.SC.U4CSE24145 – SIDDHARTH S*** in **"Computer Science and Engineering"** is a Bonafide record of the work carried out under my guidance and supervision at Amrita School of Computing, Chennai.

This Lab examination held on

Internal Examiner 1 Internal Examiner 2

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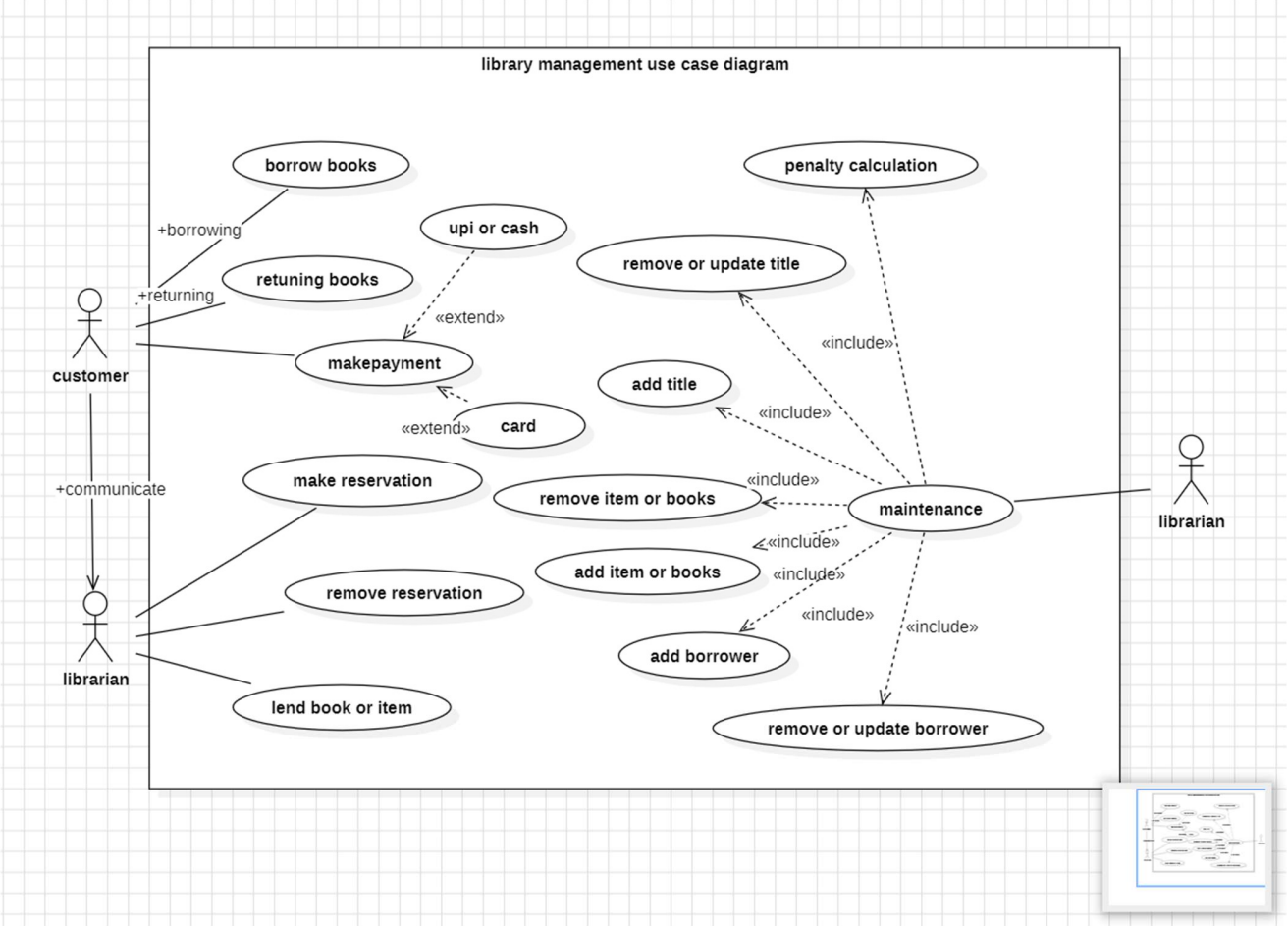
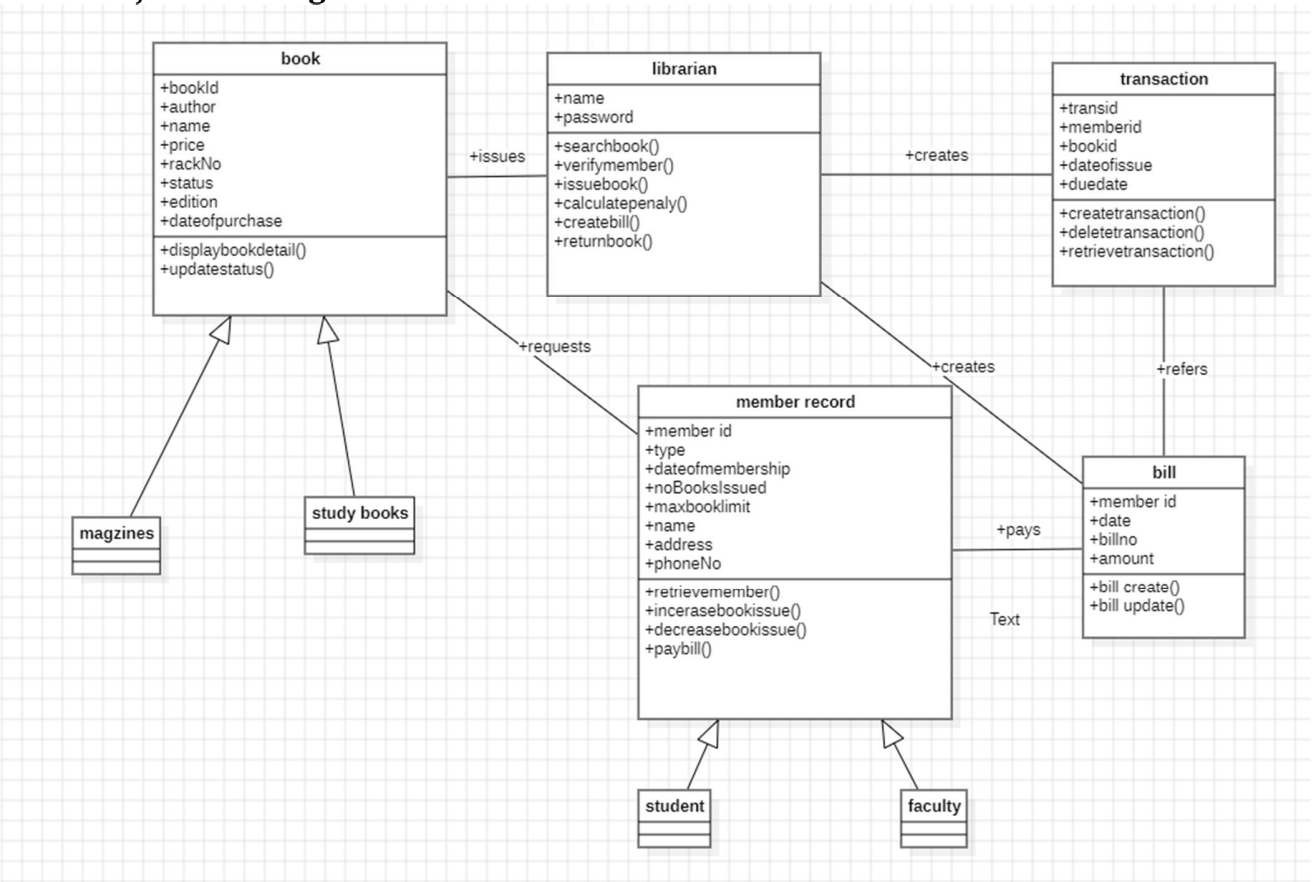
UML DIAGRAMS

1. LIBRARY MANAGEMENT SYSTEM

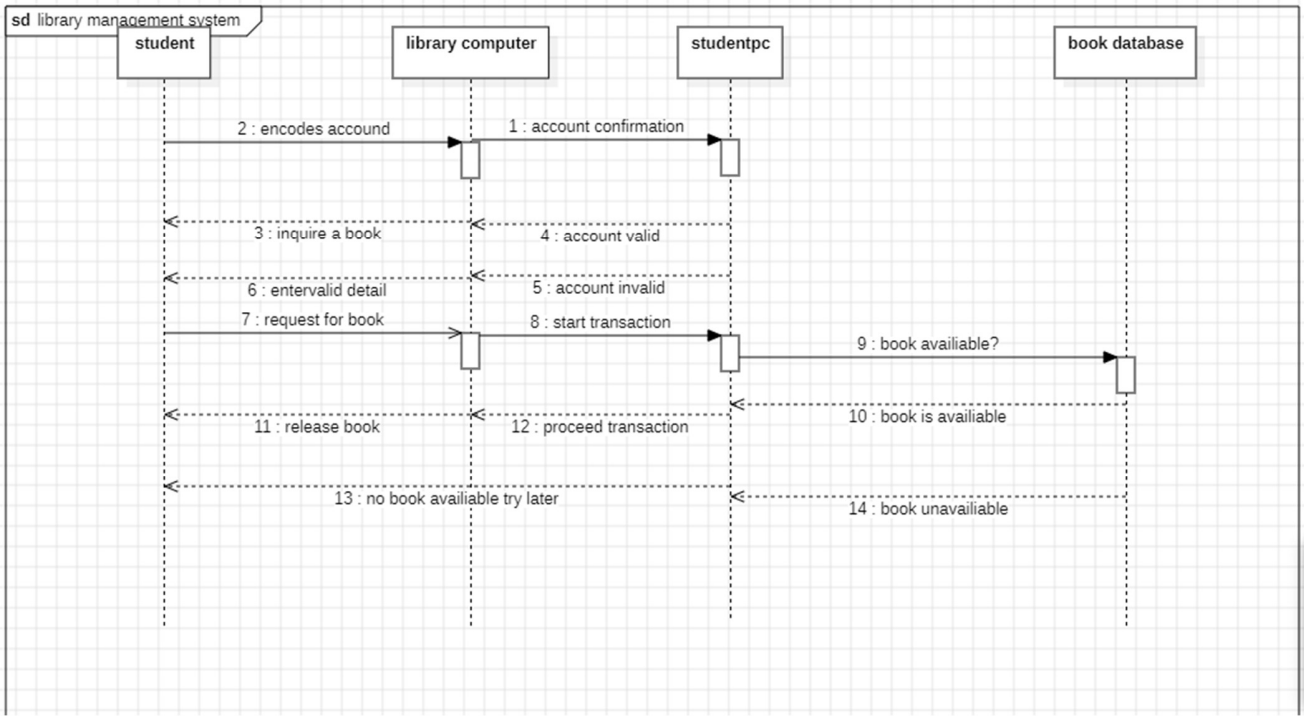
1.a) Use Case Diagram:



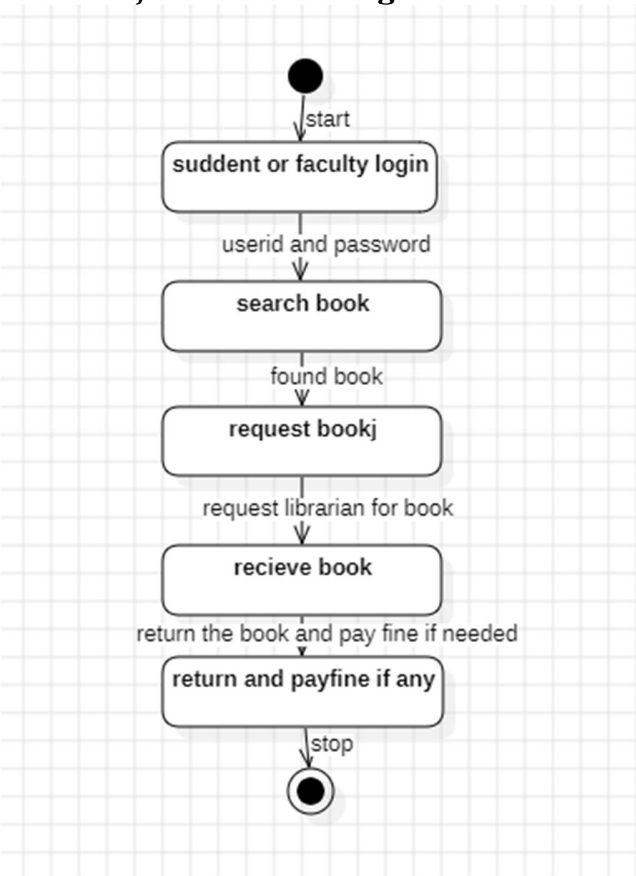
1.b) Class Diagram:



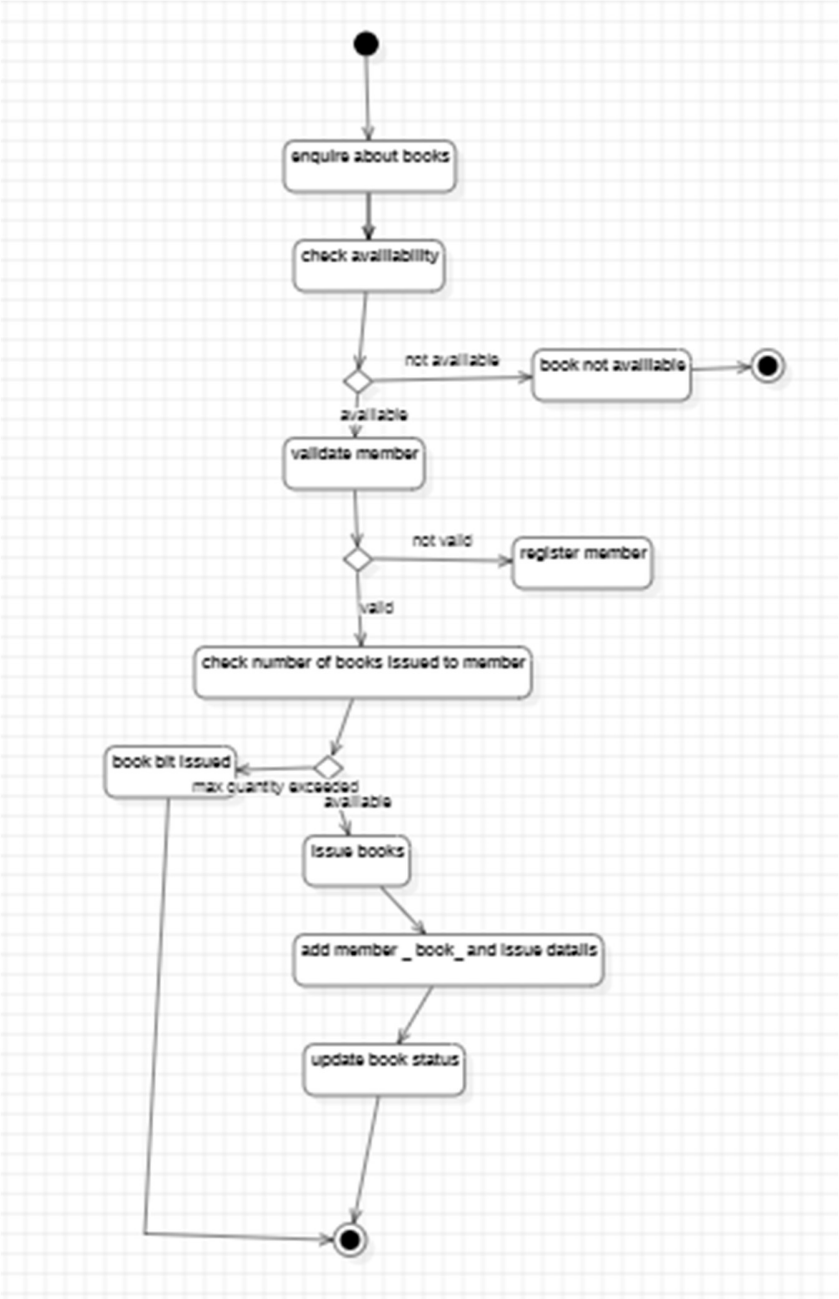
1.c) Sequence Diagram:



1.d) Statechart diagram:

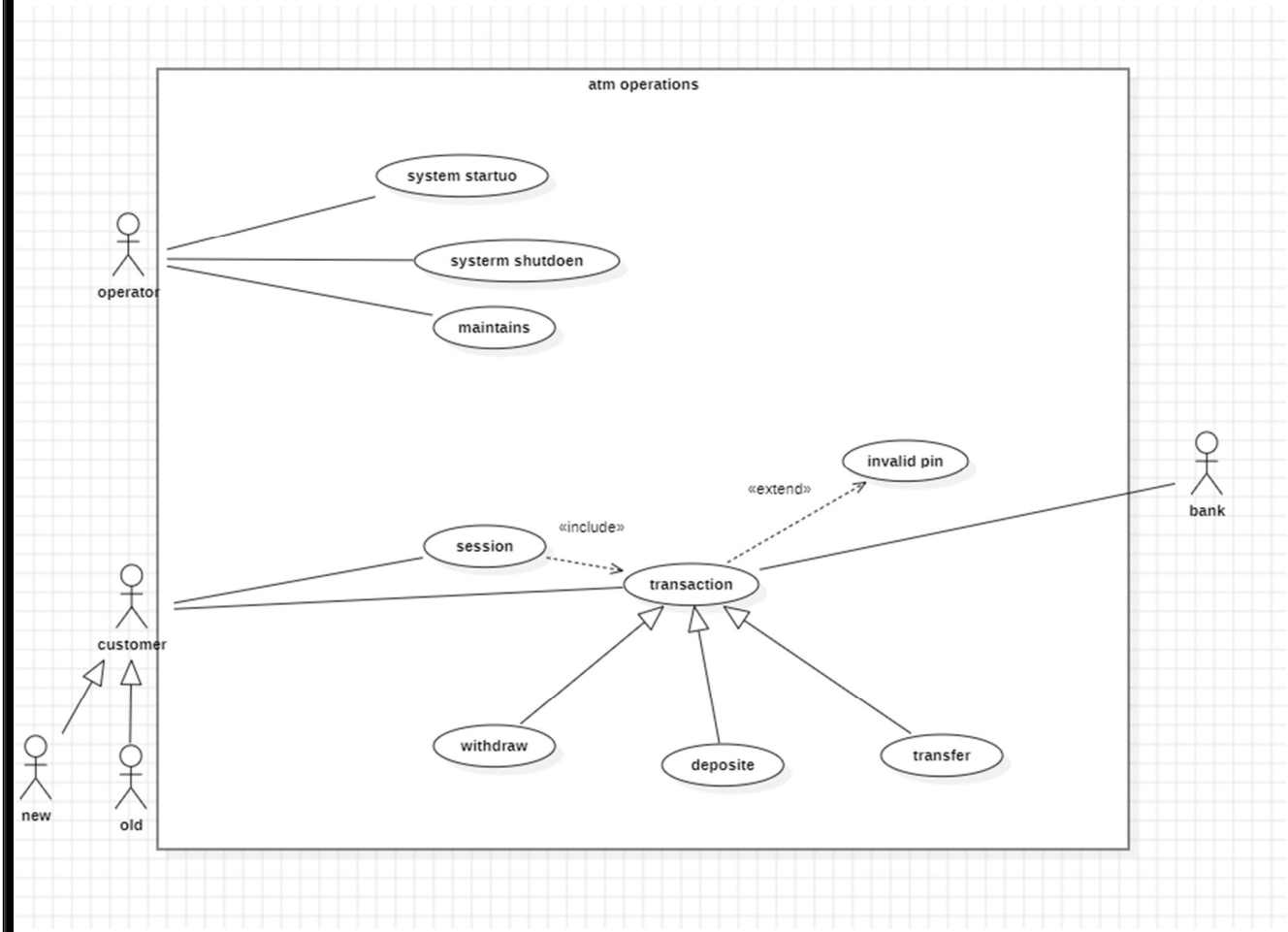


1.e) Activity Diagram:

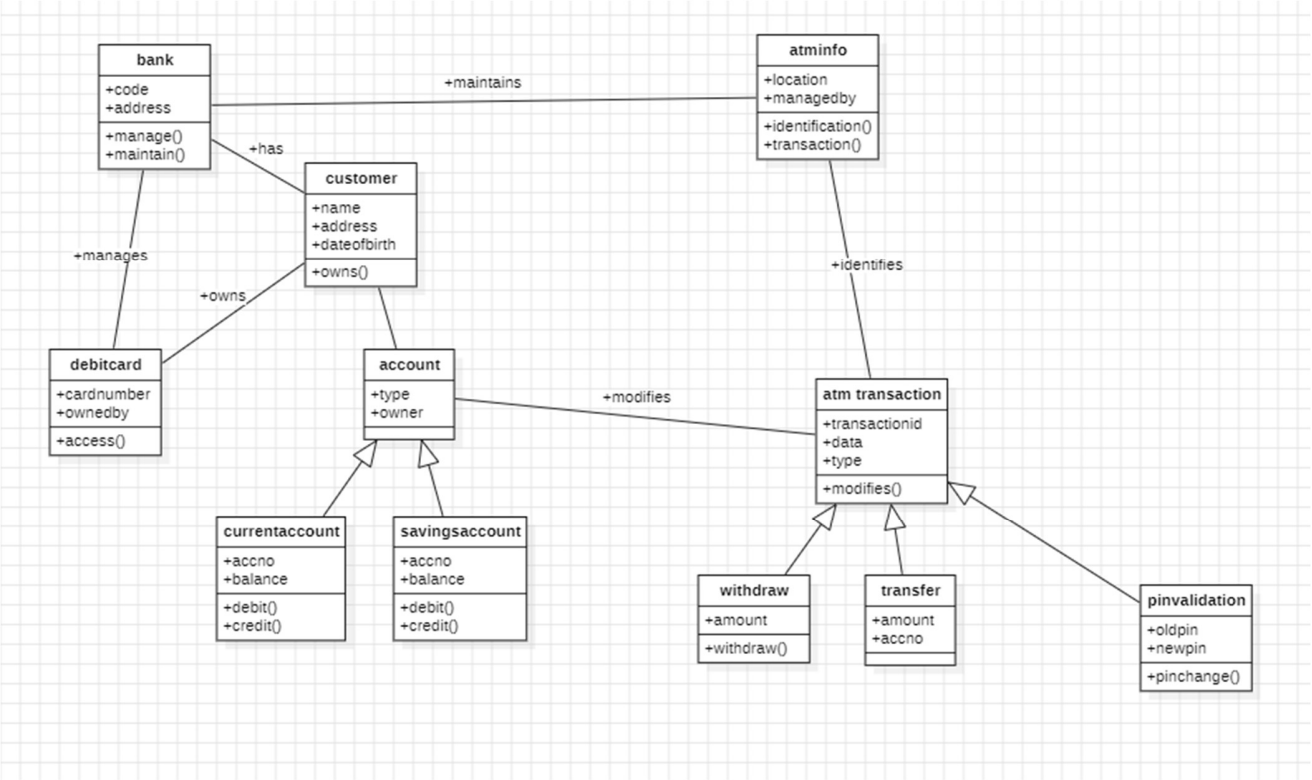


2. ATM TRANSACTION

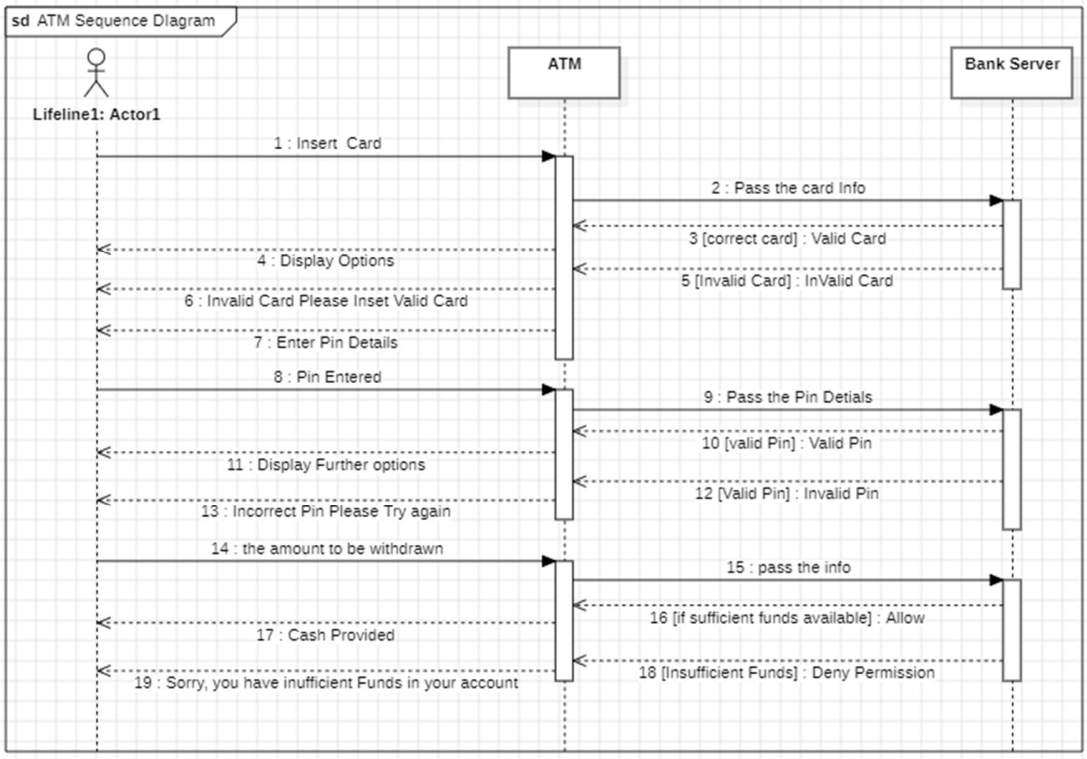
2.a) Use Case Diagram:



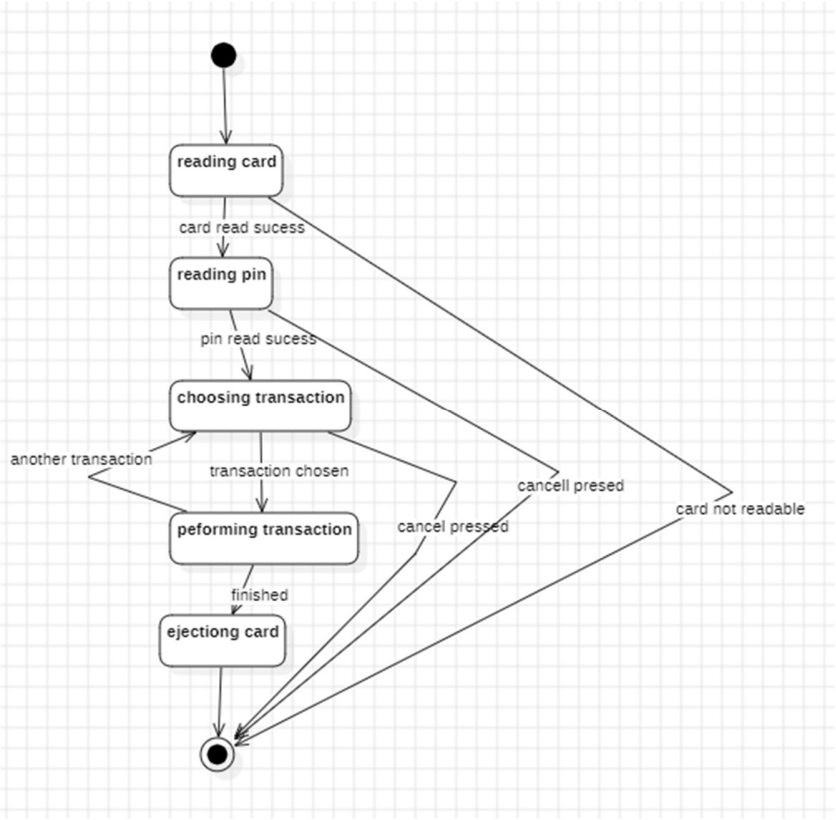
2.b) Class Diagram:



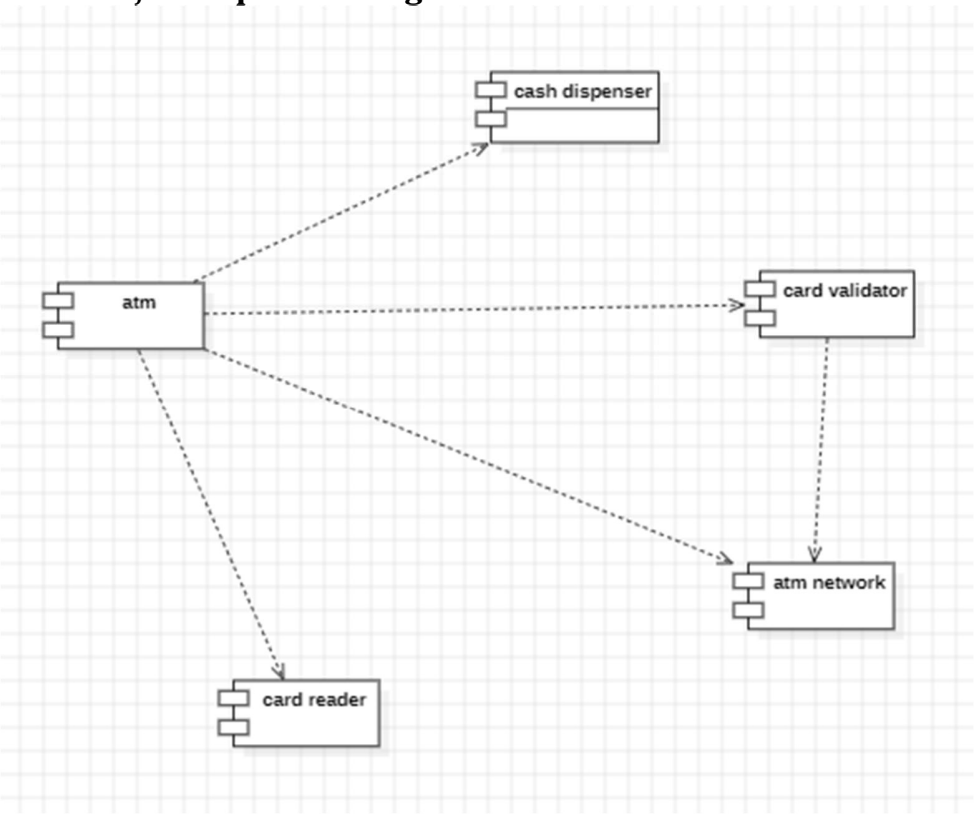
2.c) Sequence Diagram:



2.d) statechart:



2.e) component diagram:



3. Basic Java Programs

3.a) Armstrong Number:

Code:

```java
import java.util.Scanner;
public class armstrong_number
{
int num;
public armstrong_number(int num)
{
this.num = num;
}
public void operation()
{
int originalNum = num;
int sum = 0;
int digits = String.valueOf(num).length();
while (num != 0)
{
int digit = num % 10;
sum += Math.pow(digit, digits);
num /= 10;
}
if (sum == originalNum)
{
System.out.println(originalNum + " is an Armstrong number.");
}
else
{
System.out.println(originalNum + " is not an Armstrong number.");
}
}
public static void main(String[] args)
{
Scanner inp = new Scanner(System.in);
System.out.println("Enter the number: ");
int inputNum = inp.nextInt();
armstrong_number obj = new armstrong_number(inputNum);
obj.operation();
}
}
```

Output:

```
PS C:\Users\Siddharth> javac "C:\Users\Siddharth\Desktop\college\OOPS\armstr
ong_number.java"
PS C:\Users\Siddharth> java "C:\Users\Siddharth\Desktop\college\OOPS\armstro
ng_number.java"
Enter the number:
12
12 is not an Armstrong number.
PS C:\Users\Siddharth>
```

3.b) Sum of Even, Odd Digits:

Code:

```java
import java.util.Scanner;
public class even_odd_sum
{
int limit;
public even_odd_sum(int limit)
{
this.limit = limit;
}
public void operation()
{
int evenSum = 0, oddSum = 0;
for (int i = 1; i <= limit; i++)
{
if (i % 2 == 0)
{
evenSum += i;
}
else
{
oddSum += i;
}
}
System.out.println("Sum of even numbers up to " + limit + " is: " + evenSum);
System.out.println("Sum of odd numbers up to " + limit + " is: " + oddSum);
}
public static void main(String[] args)
{
Scanner inp = new Scanner(System.in);
System.out.println("Enter the limit: ");
int inputLimit = inp.nextInt();
even_odd_sum obj = new even_odd_sum(inputLimit);
obj.operation();
}
}
```

Output:

```
PS C:\Users\Siddharth> java "C:\Users\Siddharth\Desktop\college\OOPS\even_od
d_sum[1].java"
Enter the limit:
25
Sum of even numbers up to 25 is: 156
Sum of odd numbers up to 25 is: 169
```

3.c) Factorial:

Code:

```java
import java.util.Scanner;
public class factorial_number
{
int num;
public factorial_number(int num)
{
this.num = num;
}
public void operation()
{
long factorial = 1;
for (int i = 1; i <= num; i++)
{
factorial *= i; // Multiply factorial by i
}
System.out.println("Factorial of " + num + " is: " + factorial);
}
public static void main(String[] args)
{
Scanner inp = new Scanner(System.in);
System.out.println("Enter the number: ");
int inputNum = inp.nextInt();
factorial_number obj = new factorial_number(inputNum);
obj.operation();
}
}
```

Output:

```
PS C:\Users\Siddharth> java "C:\Users\Siddharth\Desktop\college\OOPS\factor:
al_number.java"
Enter the number:
4
Factorial of 4 is: 24
PS C:\Users\Siddharth>
```

3.d) Fibonacci Series:

Code:

```java
import java.util.Scanner;
public class fibonacci_series
{
int limit;
public fibonacci_series(int limit)
{
this.limit = limit;
}
public void operation()
{
int num1 = 0, num2 = 1;
System.out.println("Fibonacci Series up to " + limit + " terms:");
for (int i = 1; i <= limit; i++)
{
System.out.print(num1 + " ");
int nextNum = num1 + num2;
num1 = num2;
num2 = nextNum;
}
System.out.println();
}
public static void main(String[] args)
{
Scanner inp = new Scanner(System.in);
System.out.println("Enter the number of terms for the Fibonacci series: ");
int inputLimit = inp.nextInt();
fibonacci_series obj = new fibonacci_series(inputLimit);
obj.operation();
}
}
```

Output;

```
PS C:\Users\Siddharth> java "C:\Users\Siddharth\Desktop\college\OOPS\fibonac
ci_series.java"
Enter the number of terms for the Fibonacci series:
5
Fibonacci Series up to 5 terms:
0 1 1 2 3
```

3.e) LCM Calculator:

Code:

```
import java.util.Scanner;
public class lcm_numbers
{
int num1, num2;
public lcm_numbers(int num1, int num2)
{
this.num1 = num1;
this.num2 = num2;
}
public void operation()
{
int lcm = (num1 > num2) ? num1 : num2;
while (true)
{
if (lcm % num1 == 0 && lcm % num2 == 0)
{
System.out.println("LCM of " + num1 + " and " + num2 + " is: " + lcm);
break;
}
lcm++;
}
}
public static void main(String[] args)
{
Scanner inp = new Scanner(System.in);
System.out.println("Enter the first number: ");
int inputNum1 = inp.nextInt();
System.out.println("Enter the second number: ");
int inputNum2 = inp.nextInt();
lcm_numbers obj = new lcm_numbers(inputNum1, inputNum2);
obj.operation();
}
}
```

Output:

```
PS C:\Users\Siddharth> java "C:\Users\Siddharth\Desktop\college\OOPS\lcm_num
bers.java"
Enter the first number:
2
Enter the second number:
8
LCM of 2 and 8 is: 8
PS C:\Users\Siddharth>
```

3.f) Number Triangle:

Code:

```
import java.util.Scanner;
public class lower_triangle
{
int rows;
public lower_triangle(int rows)
{
this.rows = rows;
}
public void operation()
{
for (int i = 1; i <= rows; i++)
{
for (int j = 1; j <= i; j++)
{
System.out.print(j + " ");
}
System.out.println();
}
}
public static void main(String[] args)
{
Scanner inp = new Scanner(System.in);
System.out.println("Enter the number of rows: ");
int inputRows = inp.nextInt();
lower_triangle obj = new lower_triangle(inputRows);
obj.operation();
}
}
```

Output:

```
PS C:\Users\Siddharth> java "C:\Users\Siddharth\Desktop\college\OOPS\lower_triangle.java"
Enter the number of rows:
3
1
1 2
1 2 3
PS C:\Users\Siddharth>
```

3.g) Palindrome Check:

Code:

```java
import java.util.Scanner;
public class palindrome_number
{
int num;
int reversedNum = 0;
public palindrome_number(int num)
{
this.num = num;
}
public void operation()
{
int originalNum = num;
while (num != 0)
{
int digit = num % 10;
reversedNum = reversedNum * 10 + digit;
num = num / 10; // Remove the last digit
}
if (originalNum == reversedNum)
{
System.out.println(originalNum + " is a palindrome number.");
}
else
{
System.out.println(originalNum + " is not a palindrome number.");
}
}
public static void main(String[] args)
{
Scanner inp = new Scanner(System.in);
System.out.println("Enter the number: ");
int inputNum = inp.nextInt();
palindrome_number obj = new palindrome_number(inputNum);
obj.operation();
}
}
```

Output:

```
PS C:\Users\Siddharth> java "C:\Users\Siddharth\Desktop\college\OOPS\palindr
ome_number.java"
Enter the number:
12321
12321 is a palindrome number.
PS C:\Users\Siddharth>
```

3.h) Prime Checker:

Code:

```java
import java.util.Scanner;
public class prime_number
{
int num;
Boolean isPrime=true;
public prime_number(int num)
{
this.num=num;
}
public void operation()
{
if (num<=1)
{
isPrime=false;
}
else
{
for (int i=2;i*i<=num;i++)
{
if (num % i == 0)
{
isPrime=false;
break;
}
}
}
if (isPrime)
{
System.out.println(num + " is a prime number");
}
else
{
System.out.println(num + " is not a prime number");
}
}
public static void main (String[] args)
{
Scanner inp= new Scanner(System.in);
System.out.println("Enter the number : ");
int inputNum=inp.nextInt();
prime_number obj=new prime_number(inputNum);
obj.operation();
}
}
```

Output:

```
PS C:\Users\Siddharth> java "C:\Users\Siddharth\Desktop\college\OOPS\prime_n
umber.java"
Enter the number :
29
29 is a prime number
PS C:\Users\Siddharth>
```

3.i) Reverse Number:

Code:

```java
import java.util.Scanner;
public class reverse_number
{
int num,rev=0,digit;
public reverse_number(int num)
{
this.num=num;
}
public void operation()
{
while (num != 0)
{
digit=num%10;
rev=rev*10+digit;
num=num/10;
}
System.out.println("Reversed number : " + rev);
}
public static void main (String[] args)
{
Scanner inp= new Scanner(System.in);
System.out.println("Enter the number : ");
int inputNum=inp.nextInt();
reverse_number obj=new reverse_number(inputNum);
obj.operation();
}
}
```

Output:

```
PS C:\Users\Siddharth> java "C:\Users\Siddharth\Desktop\college\OOPS\reverse
_number.java"
Enter the number :
1234
Reversed number : 4321
PS C:\Users\Siddharth>
```

3.j) Sum of Digits:

Code:

```java
import java.util.Scanner;
public class sum_of_digits
{
int num,sum=0;
public sum_of_digits(int num)
{
this.num=num;
}
public void operation()
{
while (num != 0)
{
sum=sum+num%10;
num=num/10;
}
System.out.println("Sum of digits : " + sum);
}
public static void main (String[] args)
{
Scanner inp= new Scanner(System.in);
System.out.println("Enter the number : ");
int inputNum=inp.nextInt();
sum_of_digits obj=new sum_of_digits(inputNum);
obj.operation();
}
}
```

Output:

```
PS C:\Users\Siddharth> java "C:\Users\Siddharth\Desktop\college\OOPS\sum_of_digits[1].java"
Enter the number :
123
Sum of digits : 6
PS C:\Users\Siddharth>
```