```
package com.jinglin;

import java.util.ArrayList;
import java.util.Scanner;
import java.io.*;

public class Main {
    private static ArrayList<Customer> customers = new ArrayList<Customer>();

    public static void main(String[] args) throws IOException {
        File masterFile = new File("c:/MasterFile.txt");
        File transactionFile = new File("c:/transactionFile.txt");
        Scanner scannerMaster = new Scanner(masterFile);
        Scanner scannerTransaction = new Scanner(transactionFile);
        PrintWriter output = new PrintWriter("c:/invoice.txt");

        while(scannerMaster.hasNext()){
            String[] str = scannerMaster.nextLine().split("\t");
            if(searchCustomer(str[0]) == null) {
                customers.add(new Customer(str[0], str[1], Double.parseDouble(str[2])));
            }else{
                System.out.println("Error: Customer " + str[0] + " already exists.");
            }
        }

        while(scannerTransaction.hasNext()){
            String[] str = scannerTransaction.nextLine().split("\t");
            Customer customer = searchCustomer(str[0]);
            if(str[1].equals("O")){
                if(customer != null){
                    customer.getTransactions().add(new Transaction(str[2], str[3],
                            Double.parseDouble(str[4]), Double.parseDouble(str[5])));
                }else {
                    System.out.println("Error: Transaction " + str[2] +
                            " has wrong customer number.");
                }
            }else if(str[1].equals("P")){
                if(customer != null){
                    customer.getTransactions().add(new Transaction(str[2],
                            Double.parseDouble(str[3])));
                }else{
                    System.out.println("Error: Transaction " + str[2] +
                            " has wrong customer number.");
                }
            }
        }
        for(Customer c: customers) c.printInvoice(output);

        output.flush();
        System.out.println("The program has finished.");
        scannerMaster.close();
        scannerTransaction.close();
        output.close();
    }

    public static Customer searchCustomer(String customerNumber){
        for(Customer c: customers){
            if(c.getCustomerNumber().equals(customerNumber)){
                return c;
            }
        }
        return null;
    }
}
```

```
package com.jinglin;

import java.io.PrintWriter;
import java.util.ArrayList;

public class Customer {
    private String customerNumber;
    private String customerName;
    private double previousBalance;
    private double finalBalance;
    private ArrayList<Transaction> transactions;

    public Customer(String customerNumber, String customerName, double previousBalance) {
        this.customerNumber = customerNumber;
        this.customerName = customerName;
        this.previousBalance = previousBalance;
        this.transactions = new ArrayList<Transaction>();
    }

    public String getCustomerNumber() {
        return customerNumber;
    }

    public ArrayList<Transaction> getTransactions() {
        return transactions;
    }

    public void calculateBalance(){
        for(Transaction x: transactions){
            finalBalance += x.getAmount();
        }
        finalBalance += previousBalance;
    }

    public void printInvoice(PrintWriter output){
        output.printf("%-15sCustomer#:%s", customerName, customerNumber);
        output.println();
        output.println();
        output.printf("                       Previous balance: $%.2f", previousBalance);
        output.println();
        output.println();
        output.println("Transaction#       Item                  Amount");
        for(Transaction t: transactions){
            output.printf("    %-15s%s  $%.2f", t.getTransactionNumber(),
                    t.getItemName(), t.getAmount());
            output.println();
        }
        calculateBalance();
        output.println();
        output.printf("                            Balance due: $%.2f", finalBalance);
        output.println();
        output.println("================================================");
    }


}
```

```
package com.jinglin;

public class Transaction {
    private String transactionNumber;
    private String itemName;
    private double amount;

    public Transaction(String transactionNumber, String itemName,
                       double quantity, double cost) {
        this.transactionNumber = transactionNumber;

        //This is to fill empty spaces at the end of product name to make
        //them 20 characters each, in order to make the layout of invoice even.
        int n = 20 - itemName.length();
        if(n >= 0) {
            for(int i = 1; i <= n; i++){
                itemName += " ";
            }
            this.itemName = itemName;
        }else{
            this.itemName = itemName.substring(0, 20);
        }

        this.amount = cost * quantity;
    }

    public Transaction(String transactionNumber, double payment){
        this.transactionNumber = transactionNumber;
        this.itemName = "Payment             ";
        this.amount = -payment;
    }

    public String getTransactionNumber() {
        return transactionNumber;
    }

    public String getItemName() {
        return itemName;
    }

    public double getAmount() {
        return amount;
    }
}
```