PEMROGRAMAN BERORIENTASI OBJEK

(Tugas PBO Linked List)

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Dikumpulkan Tanggal :

16 November 2022

Universitas Padjadjaran

Fakultas Matematika dan Ilmu Pengetahuan Alam

Program Studi Teknik Informatika

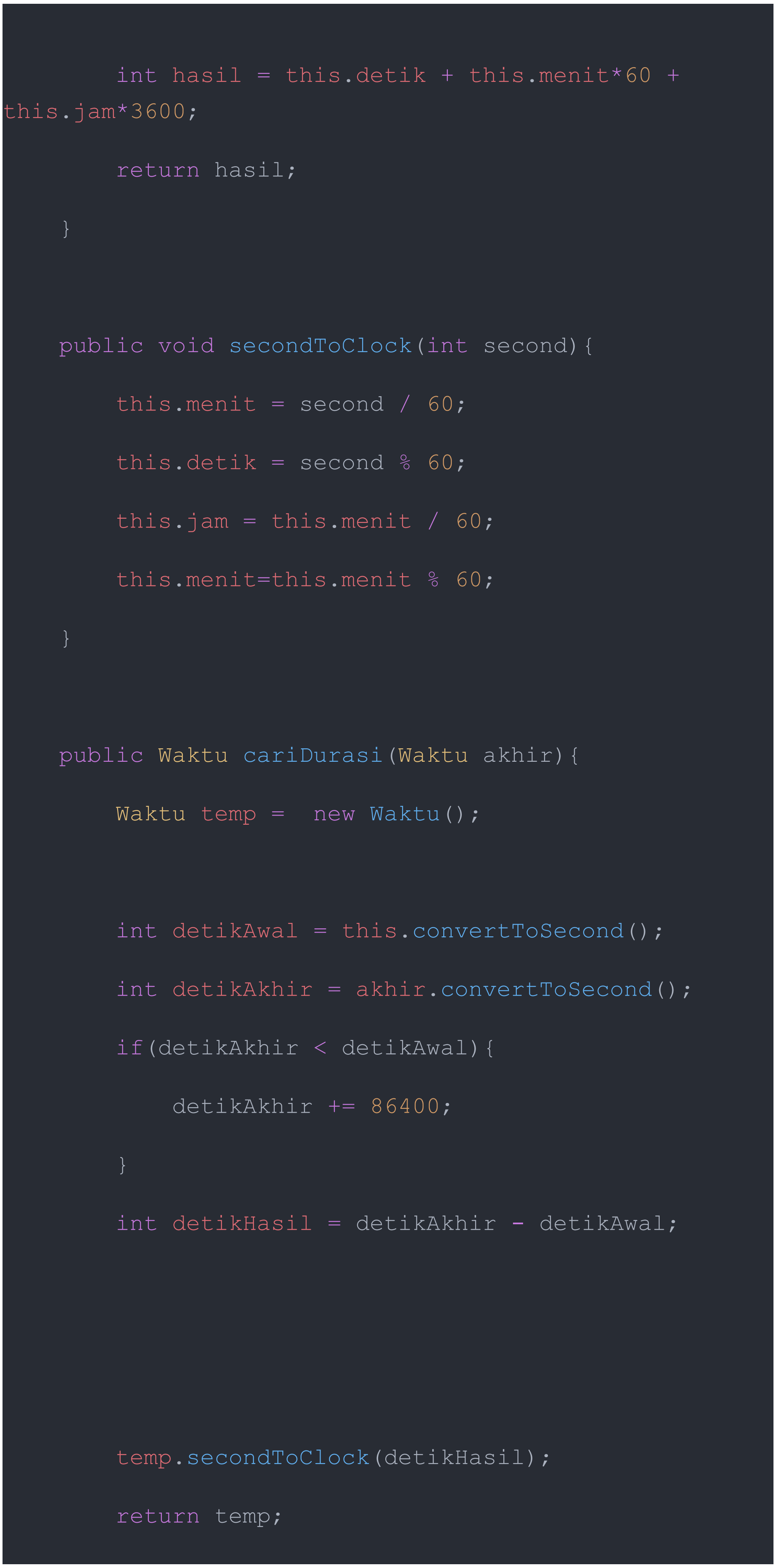
2021

1. Java

   a. Source code

      i. Class Waktu :

```java
/*

* Nama     : Amir Salim , Andre Nathaniel Adipraja , Prames Ray lapian , Ibrahim Dafi Iskandar

* NPM      : 140810210015 , 140810200042 , 140810210059 , 140810210039

* Kelas : A

* Tanggal : 16 November 2022

* Nama Program : ElementList.java

* Deskripsi :  Soal parkir - class Waktu

*/

package Waktu;

import java.util.Scanner;


public class Waktu {

    private int jam, menit, detik;


    public Waktu(int jam, int menit, int detik){

        this.jam = jam;

        this.menit = menit;

        this.detik = detik;


    }

    public Waktu(){

        this.jam = 0;

        this.menit = 0;
        this.detik = 0;
    }

    //Input
    public void setJam(int jam){
        this.jam = jam;
    }

    public void setMenit(int menit){
        this.menit = menit;
    }
    public void setDetik(int detik){
        this.detik = detik;
    }

    public void inputJam(){
        Scanner input = new Scanner(System.in);
        System.out.print("Masukkan jam   : ");
        this.jam = input.nextInt();
        System.out.print("Masukkan menit : ");
        this.menit = input.nextInt();
        System.out.print("Masukkan detik : ");
        this.detik = input.nextInt();
    }

    //Output
    public int getJam(){
        return this.jam;

    }

    public int getMenit(){

        return this.menit;

    }

    public int getDetik(){

        return this.detik;

    }


    public String getWaktu(){

        String nolJam ="", nolMenit="", nolDetik="";

        if(this.jam < 10){

            nolJam = "0";

        }

        if(this.menit < 10){

            nolMenit = "0";

        }

        if(this.detik < 10){

            nolDetik = "0";

        }


        return nolJam + this.jam + ":" + nolMenit +
this.menit + ":" + nolDetik + this.detik;

    }


    //Proses

    public int convertToSecond(){
```



```
        int hasil = this.detik + this.menit*60 +
this.jam*3600;
        return hasil;
    }

    public void secondToClock(int second){
        this.menit = second / 60;
        this.detik = second % 60;
        this.jam = this.menit / 60;
        this.menit=this.menit % 60;
    }

    public Waktu cariDurasi(Waktu akhir){
        Waktu temp =  new Waktu();

        int detikAwal = this.convertToSecond();
        int detikAkhir = akhir.convertToSecond();
        if(detikAkhir < detikAwal){
            detikAkhir += 86400;
        }
        int detikHasil = detikAkhir - detikAwal;



        temp.secondToClock(detikHasil);
        return temp;
    }

}
```

ii. Class Kendaraan :

```
/*

* Nama     : Amir Salim , Andre Nathaniel Adipraja , 
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* NPM      : 140810210015 , 140810200042 , 140810210059 
, 140810210039

* Kelas : A

* Tanggal : 16 November 2022

* Nama Program : Kendaraan.java

* Deskripsi :  Soal parkir - class Kendaraan

*/

package Kendaraan;

import Waktu.Waktu;

import java.util.Scanner;


public abstract class Kendaraan {

        protected String no;

        protected String jenis;

        protected Waktu datang = new Waktu();

        protected Waktu pulang = new Waktu();


        public Kendaraan(){
```
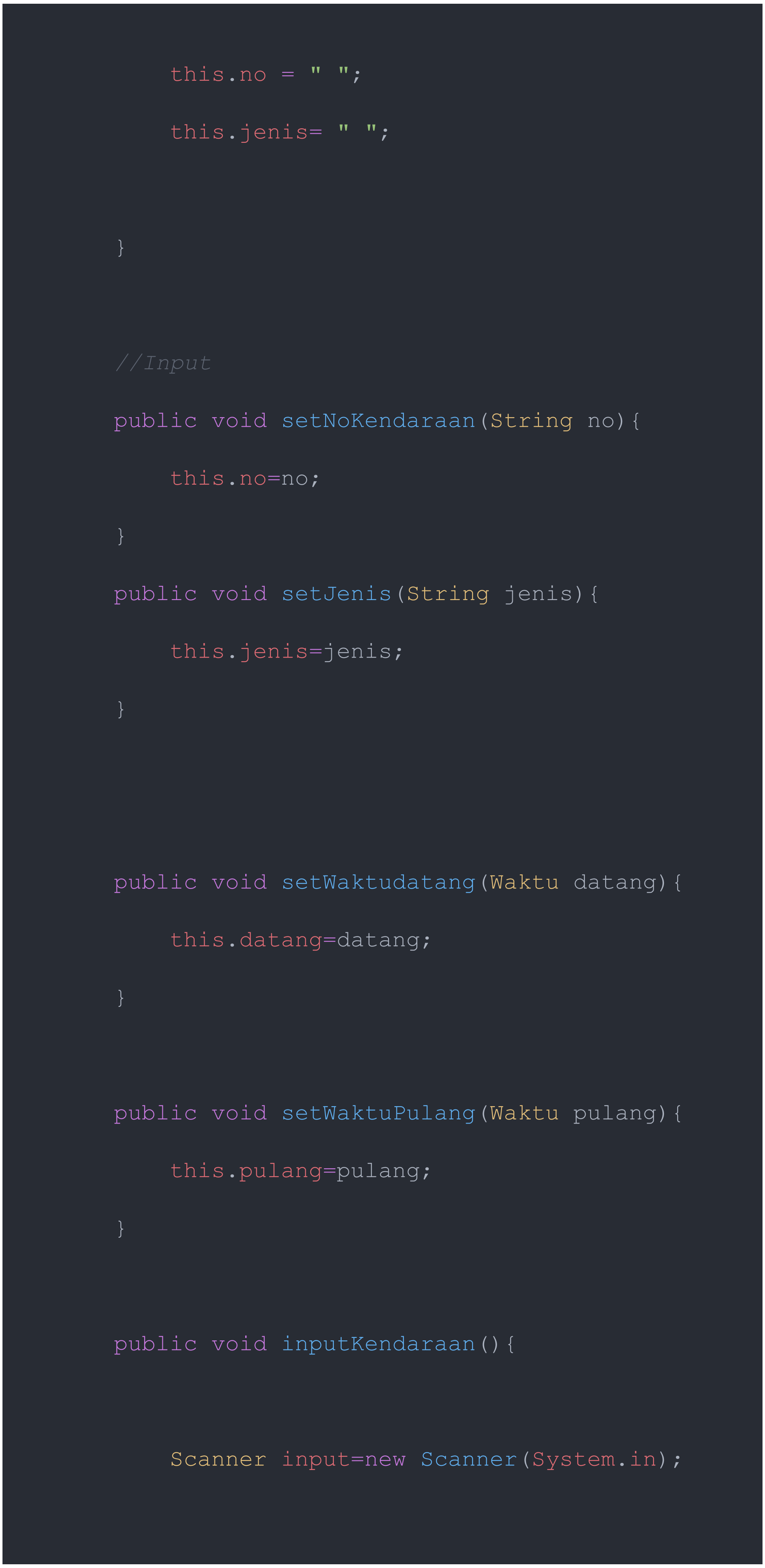
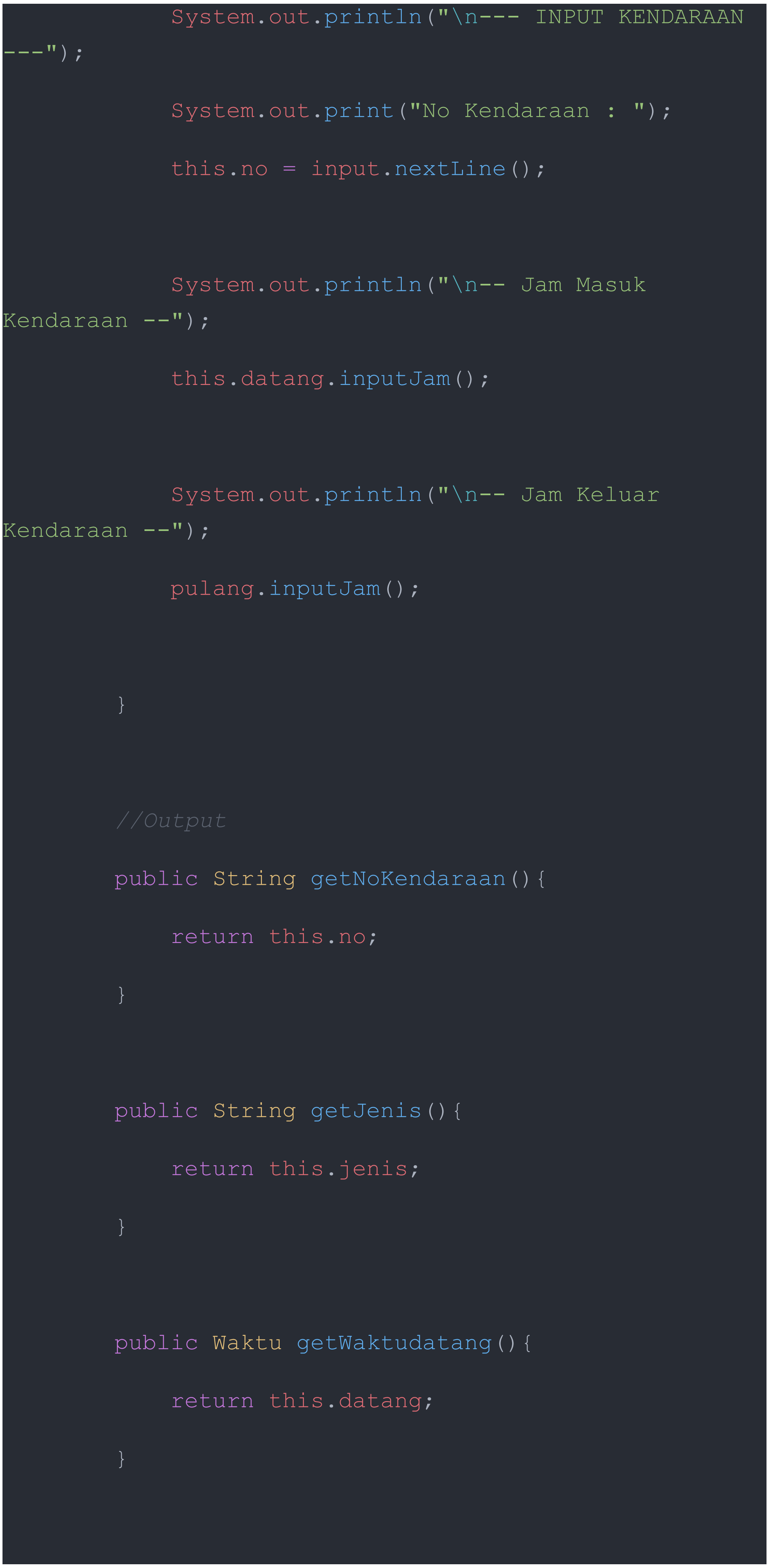



```
        this.no = " ";
        this.jenis= " ";

    }

    //Input
    public void setNoKendaraan(String no){
        this.no=no;
    }
    public void setJenis(String jenis){
        this.jenis=jenis;
    }


    public void setWaktudatang(Waktu datang){
        this.datang=datang;
    }

    public void setWaktuPulang(Waktu pulang){
        this.pulang=pulang;
    }

    public void inputKendaraan(){

        Scanner input=new Scanner(System.in);
```



```
            System.out.println("\n--- INPUT KENDARAAN ---");

            System.out.print("No Kendaraan : ");

            this.no = input.nextLine();


            System.out.println("\n-- Jam Masuk Kendaraan --");

            this.datang.inputJam();


            System.out.println("\n-- Jam Keluar Kendaraan --");

            pulang.inputJam();


        }


        //Output

        public String getNoKendaraan(){

            return this.no;

        }


        public String getJenis(){

            return this.jenis;

        }


        public Waktu getWaktudatang(){

            return this.datang;

        }
        public Waktu getWaktuPulang(){
            return this.pulang;
        }

        //Proses
        public Waktu getLamaParkir(){
            return 
this.datang.cariDurasi(this.pulang);
        }

        public int getLamaJam(){
            int hasil = 0;
            if(this.getLamaParkir().getMenit()>=10 || 
this.getLamaParkir().getJam()>=1){
                hasil = this.getLamaParkir().getJam();

                if( this.getLamaParkir().getMenit()>0 
|| this.getLamaParkir().getDetik()>0 ){
                    hasil +=1;
                }

            }
            return hasil;
        }

        public abstract int getBiayaParkir();
        // hasil = getLamaJam() * 2000;
        public void getKendaraan(){

            System.out.println("No kendaraan = " +
this.no);

            System.out.println("Jenis = " +
this.jenis);

            System.out.println("Jam Masuk = " +
this.getWaktudatang().getWaktu());

            System.out.println("Jam Pulang = " +
this.getWaktuPulang().getWaktu());

            System.out.println("Lama Parkir = " +
this.getLamaParkir().getWaktu());

            System.out.println("Lama jam = " +
this.getLamaJam());

            System.out.println("Biaya = " +
this.getBiayaParkir());

        }




}
```

iii. Class Mobil :

```
/*

* Nama    : Amir Salim , Andre Nathaniel Adipraja ,
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* NPM     : 140810210015 , 140810200042 , 140810210059
, 140810210039

* Kelas : A
* Tanggal : 16 November 2022

* Nama Program : Mobil.java

* Deskripsi :  Soal parkir - class mobil list

*/

package Kendaraan;


public class Mobil extends Kendaraan {

    public Mobil(){

        super();

        this.jenis = "Mobil";

    }


    @Override

    public int getBiayaParkir() {

        return getLamaJam() * 3000;

    }



}
```

iv. Class Truck

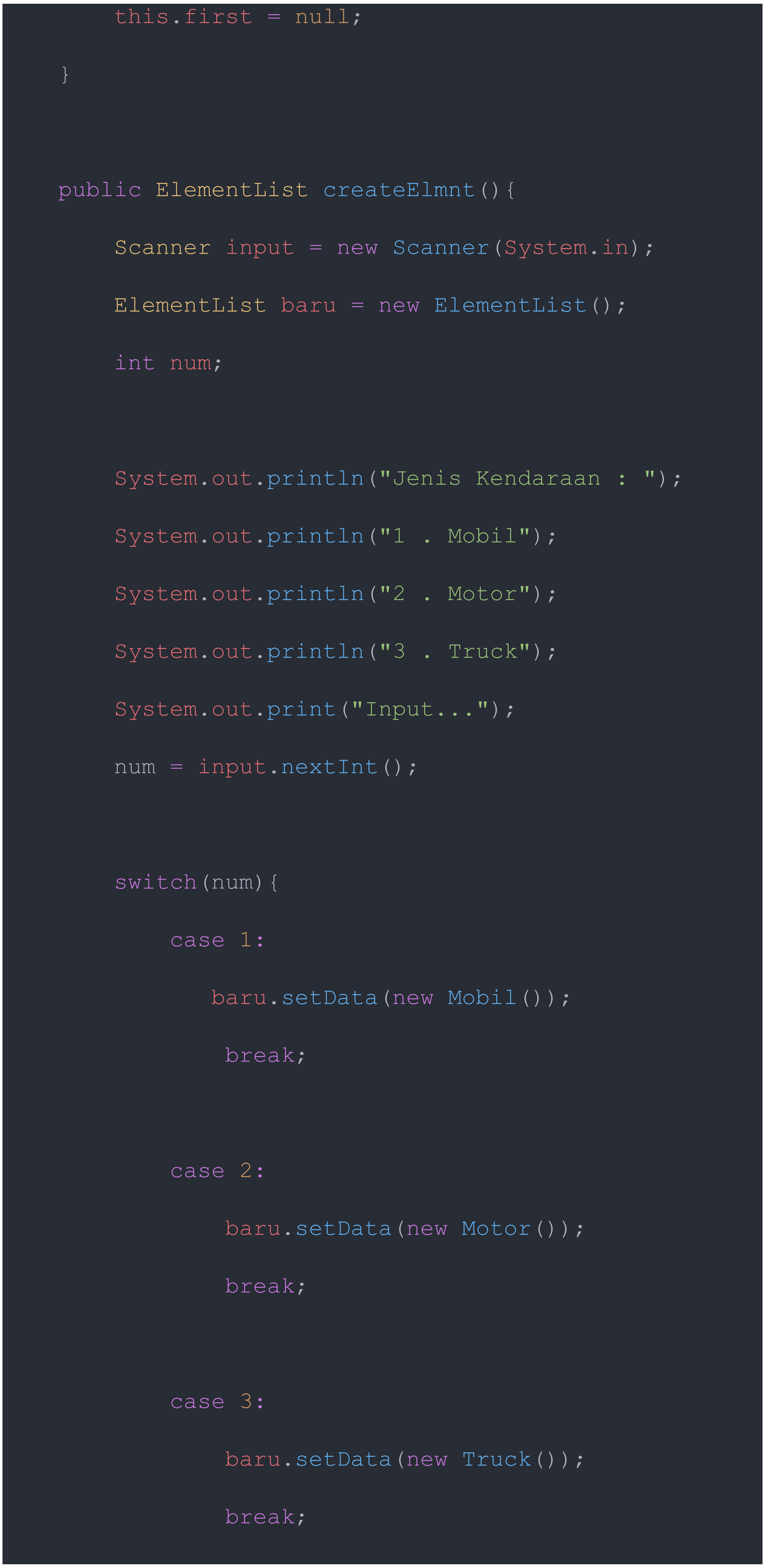
```
/*

* Nama     : Amir Salim , Andre Nathaniel Adipraja , Prames Ray lapian , Ibrahim Dafi Iskandar

* NPM      : 140810210015 , 140810200042 , 140810210059 , 140810210039

* Kelas : A
* Tanggal : 16 November 2022
* Nama Program : ElementList.java
* Deskripsi :  Soal parkir - class Truck
*/
package Kendaraan;

public class Truck extends Kendaraan {
    public Truck(){
        super();
        this.jenis="Truck";
    }

    @Override
    public int getBiayaParkir() {
        return getLamaJam() * 10000;
    }


}
```

v. Class Element List

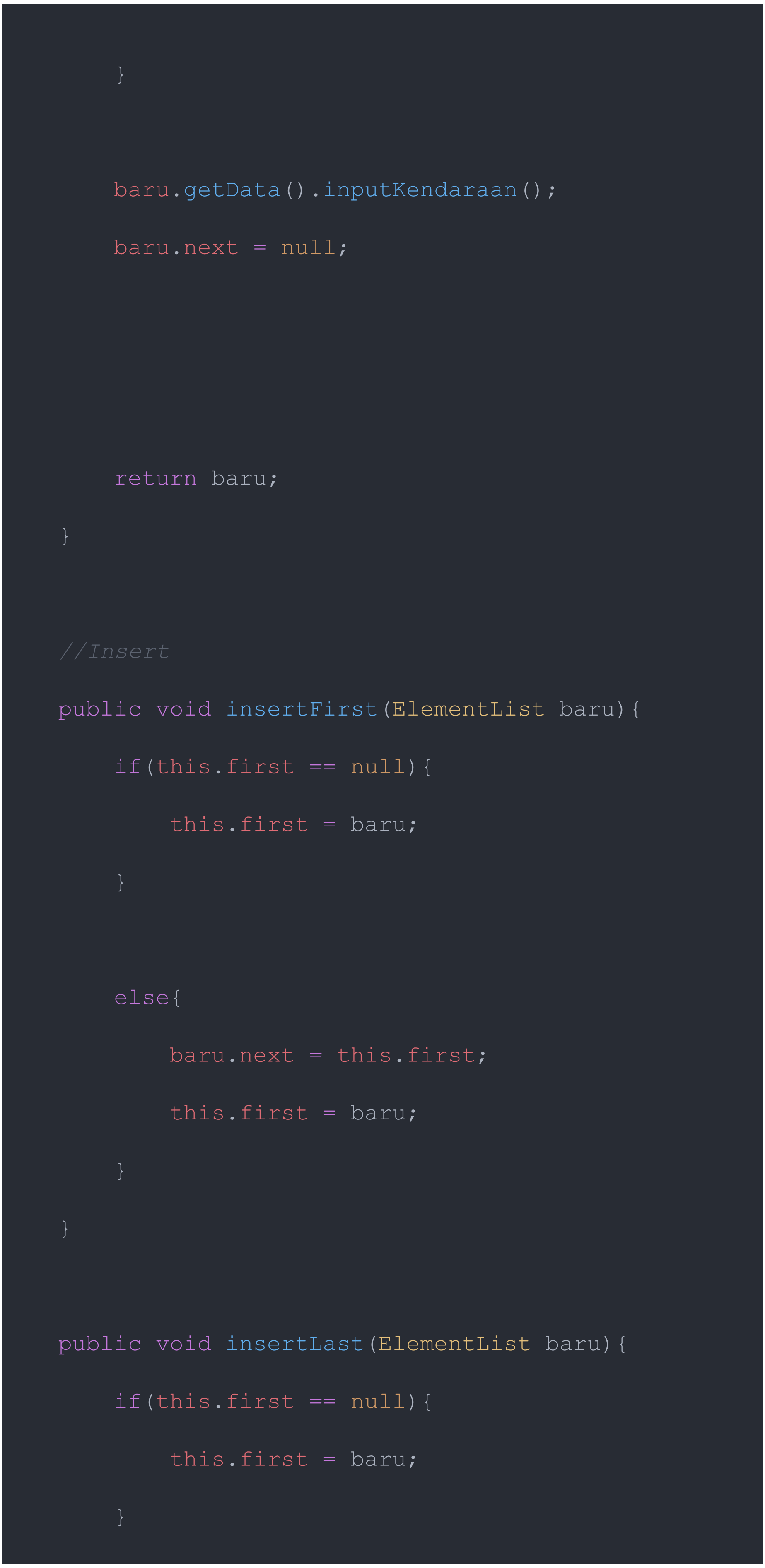
```
/*
* Nama     : Amir Salim , Andre Nathaniel Adipraja , Prames Ray lapian , Ibrahim Dafi Iskandar
* NPM      : 140810210015 , 140810200042 , 140810210059 , 140810210039
* Kelas : A
* Tanggal : 16 November 2022

* Nama Program : ElementList.java

* Deskripsi :  Soal parkir - class element list

*/

package DataStructure;

import Kendaraan.Kendaraan;


public class ElementList {

    private Kendaraan data;

    ElementList next;


    public ElementList(){

        this.data = null;

        this.next = null;

    }


    public ElementList(Kendaraan data){

        this.data = data;

        this.next = null;

    }


    public void setData(Kendaraan data){

        this.data = data;

    }


    public Kendaraan getData(){

        return this.data;
    }


}
```

vi. Class Linked List

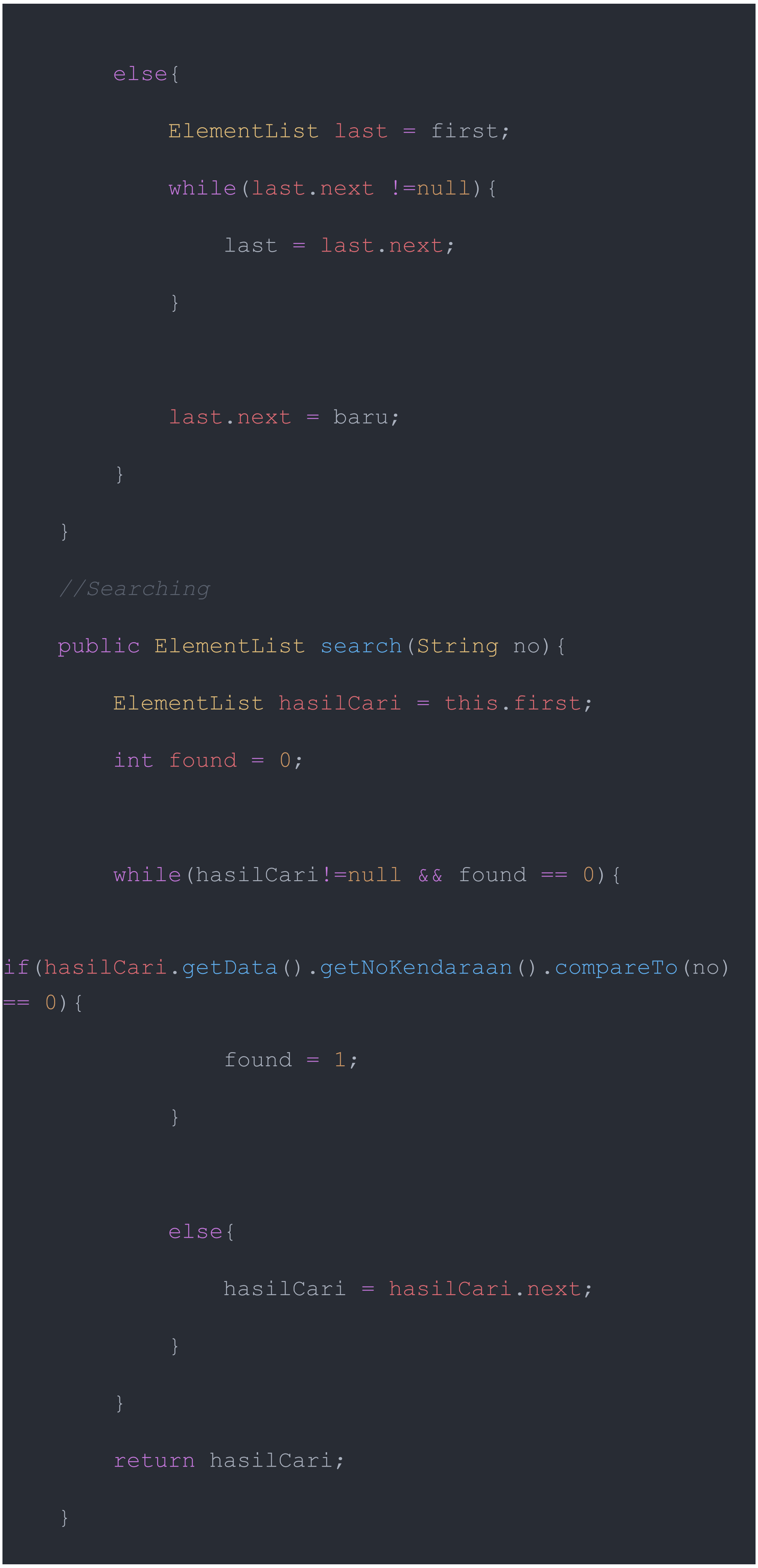
```
/*

* Nama     : Amir Salim , Andre Nathaniel Adipraja , 
Prames Ray lapian , Ibrahim Dafi Iskandar

* NPM      : 140810210015 , 140810200042 , 140810210059 
, 140810210039

* Kelas : A

* Tanggal : 16 November 2022

* Nama Program : LinkedList.java

* Deskripsi :  Soal parkir - class Linked List

*/

package DataStructure;

import java.util.Scanner;

import Kendaraan.*;

public class LinkedList {

    private ElementList first;


    public LinkedList(){

        this.first = null;

    }


    public void createList(){
```



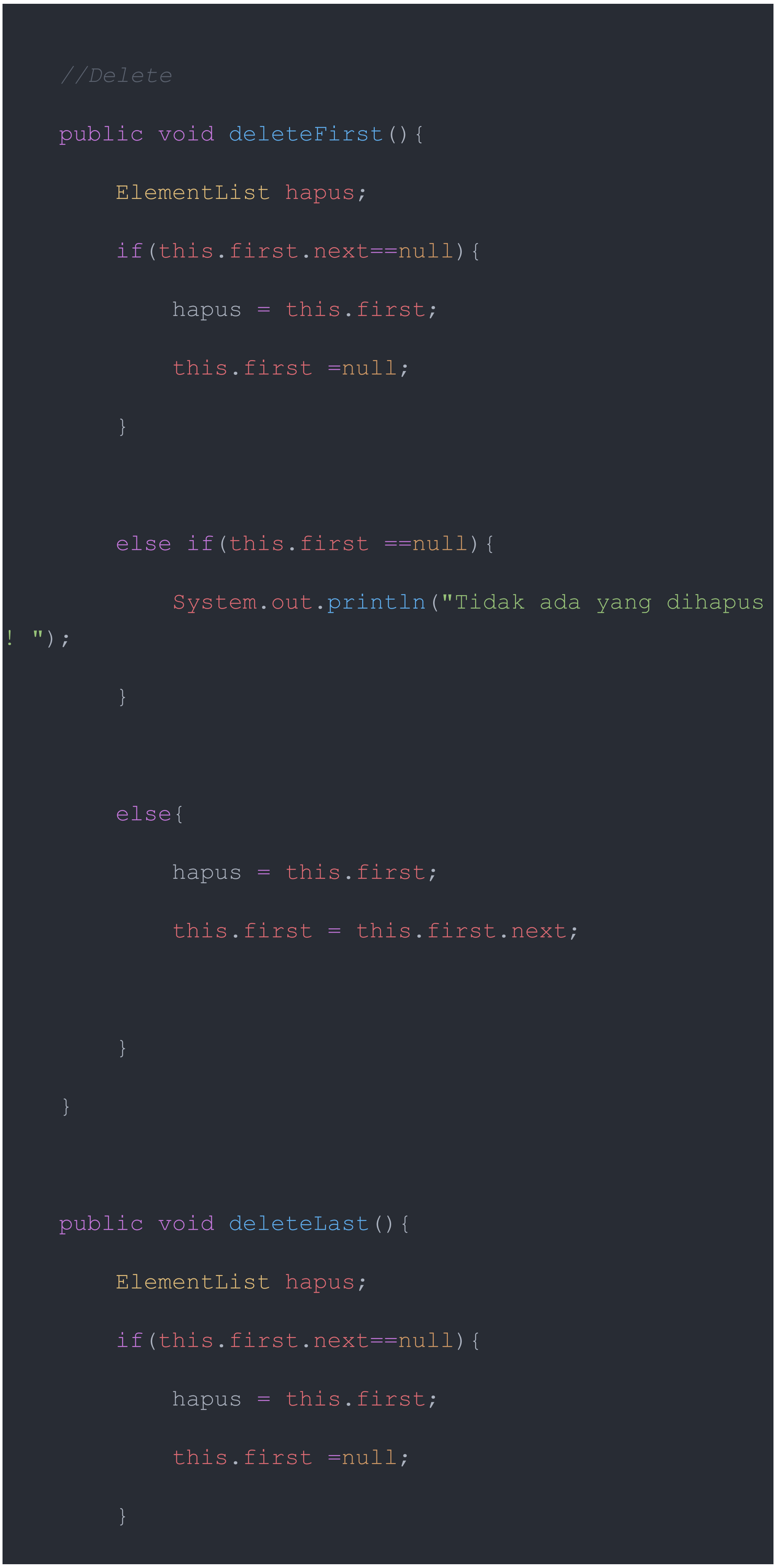
```
        this.first = null;

    }


    public ElementList createElmnt(){

        Scanner input = new Scanner(System.in);

        ElementList baru = new ElementList();

        int num;


        System.out.println("Jenis Kendaraan : ");

        System.out.println("1 . Mobil");

        System.out.println("2 . Motor");

        System.out.println("3 . Truck");

        System.out.print("Input...");

        num = input.nextInt();


        switch(num){

            case 1:

               baru.setData(new Mobil());

                break;


            case 2:

                baru.setData(new Motor());

                break;


            case 3:

                baru.setData(new Truck());

                break;
```



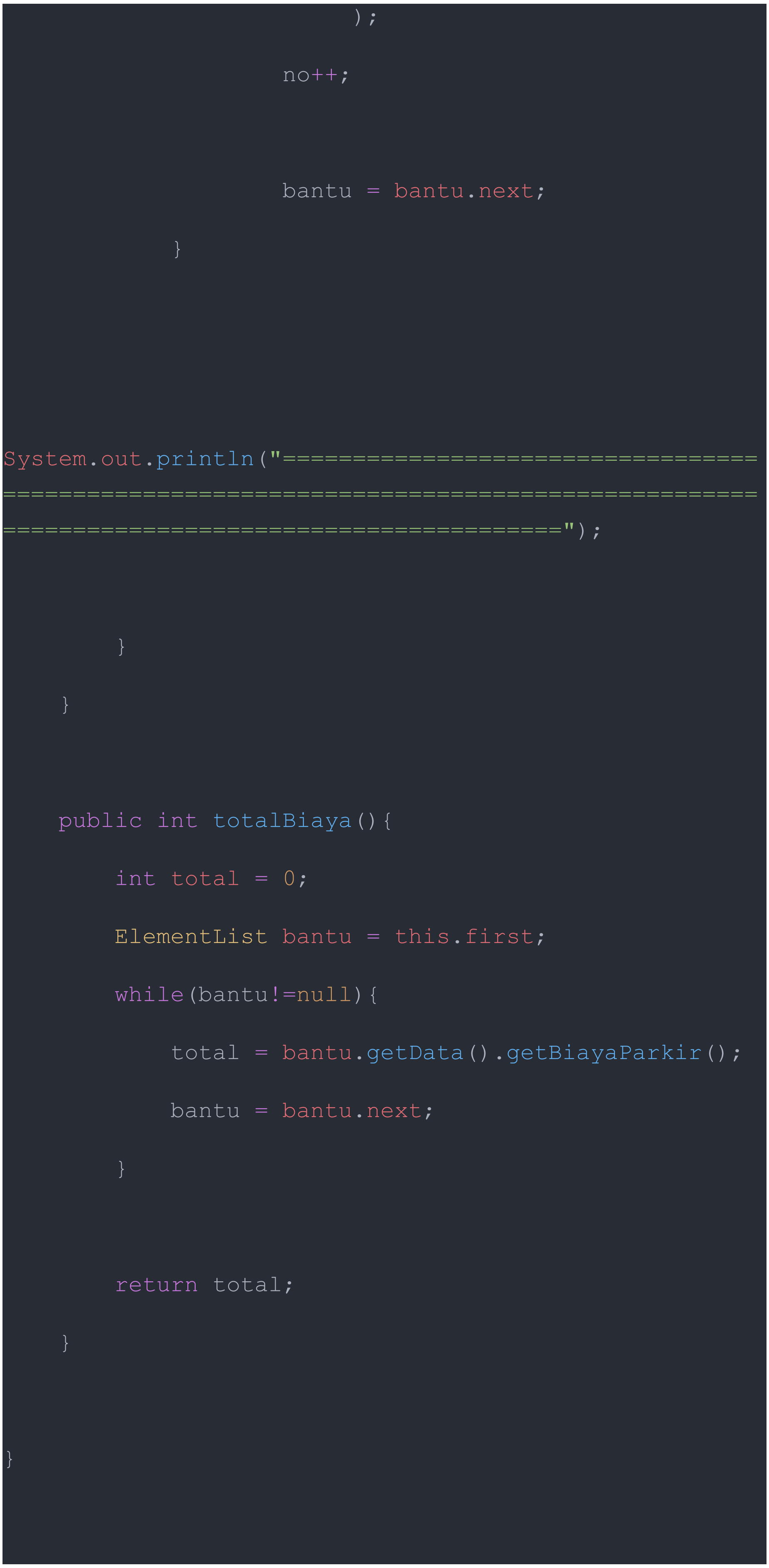
```
    }

    baru.getData().inputKendaraan();
    baru.next = null;



    return baru;
}

//Insert
public void insertFirst(ElementList baru){
    if(this.first == null){
        this.first = baru;
    }

    else{
        baru.next = this.first;
        this.first = baru;
    }
}

public void insertLast(ElementList baru){
    if(this.first == null){
        this.first = baru;
    }
```



```
        else{
            ElementList last = first;
            while(last.next !=null){
                last = last.next;
            }

            last.next = baru;
        }
    }
    //Searching
    public ElementList search(String no){
        ElementList hasilCari = this.first;
        int found = 0;

        while(hasilCari!=null && found == 0){
if(hasilCari.getData().getNoKendaraan().compareTo(no)
== 0){
                found = 1;
            }

            else{
                hasilCari = hasilCari.next;
            }
        }
        return hasilCari;
    }
```



```
    //Delete
    public void deleteFirst(){
        ElementList hapus;
        if(this.first.next==null){
            hapus = this.first;
            this.first =null;
        }

        else if(this.first ==null){
            System.out.println("Tidak ada yang dihapus ! ");
        }

        else{
            hapus = this.first;
            this.first = this.first.next;

        }
    }

    public void deleteLast(){
        ElementList hapus;
        if(this.first.next==null){
            hapus = this.first;
            this.first =null;
        }
        else if(this.first ==null){
            System.out.println("Tidak ada yang dihapus ! ");
        }

        else{
            ElementList b4last = first;
            while(b4last.next.next !=null){
                b4last = b4last.next;
            }

            hapus = b4last.next.next;
            b4last.next = null;

        }
    }



    //Traversal
    public void printData(){
        System.out.println("\t\t\t\tRekapitulasi Biaya parkir PT Parkir Jaya");
        if(this.first == null){
            System.out.println("List Kosong ! ");
        }


        else{
            int no = 1;

System.out.println("==================================
======================================================
========================================");
            System.out.println("No\tNo
Kendaraan\t\tJenis\tJam Masuk\tJam Pulang\tLama
Parkir\tLama jam\tBiaya");

System.out.println("==================================
======================================================
========================================");
            ElementList bantu = this.first;
            while(bantu!=null){

                    System.out.println(
                        no + "\t" +

bantu.getData().getNoKendaraan() + "\t\t" +
                        bantu.getData().getJenis()+
"\t" +

bantu.getData().getWaktudatang().getWaktu() + "\t" +

bantu.getData().getWaktuPulang().getWaktu() + "\t" +

bantu.getData().getLamaParkir().getWaktu() + "\t " +
                        bantu.getData().getLamaJam() +
"\t\t" +

bantu.getData().getBiayaParkir() + "\t  "
```



```
                         );
                    no++;

                    bantu = bantu.next;
            }



System.out.println("==================================
======================================================
========================================");

        }
    }

    public int totalBiaya(){
        int total = 0;
        ElementList bantu = this.first;
        while(bantu!=null){
            total = bantu.getData().getBiayaParkir();
            bantu = bantu.next;
        }

        return total;
    }

}
```

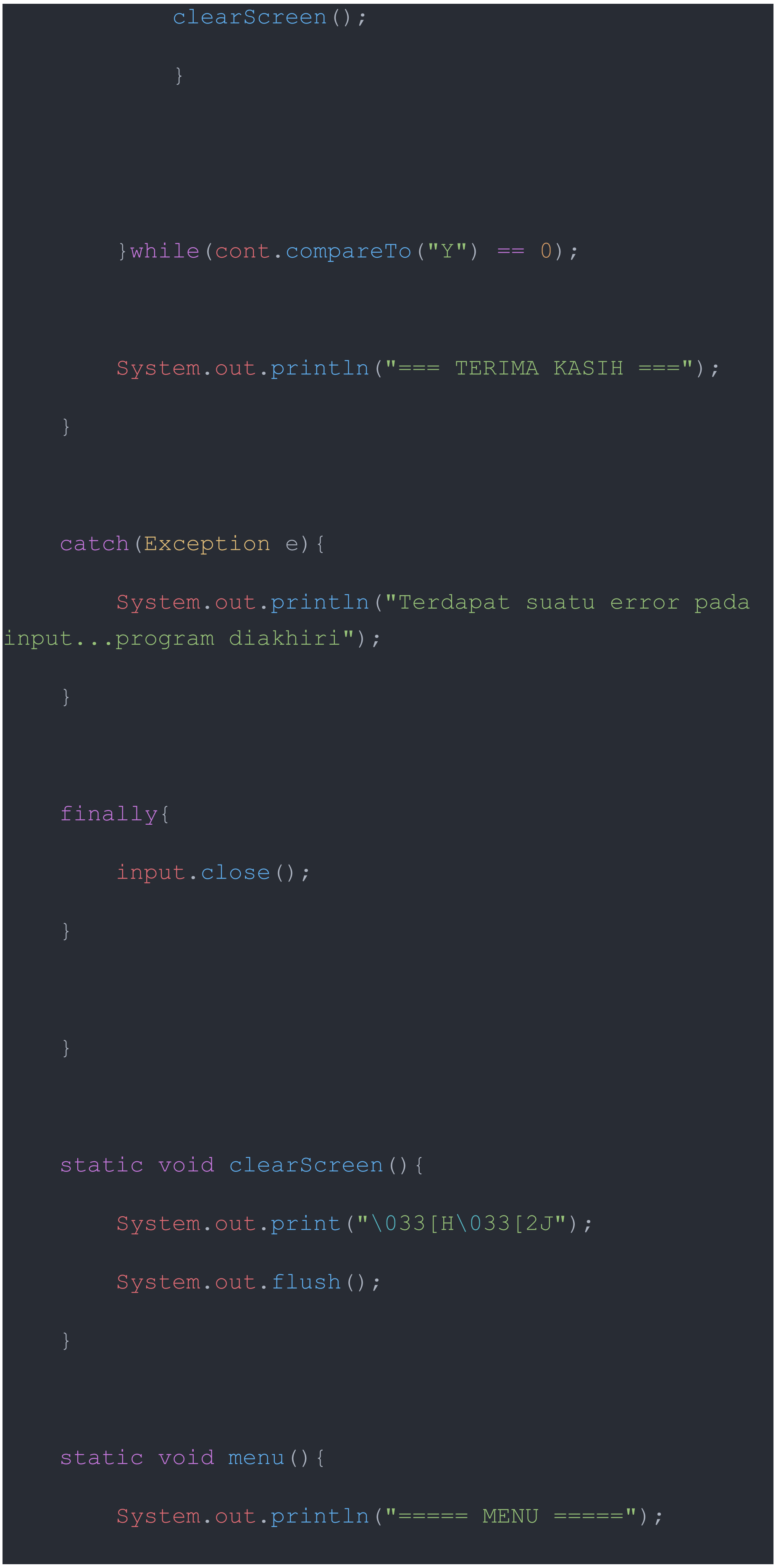
vii. Class Main

```
/*
* Nama     : Amir Salim , Andre Nathaniel Adipraja , Prames Ray lapian , Ibrahim Dafi Iskandar
* NPM      : 140810210015 , 140810200042 , 140810210059 , 140810210039
* Kelas : A
* Tanggal : 16 November 2022
* Nama Program : App.java
* Deskripsi :  Soal parkir - class main (program parkir dengan singly linked list)
*/
import DataStructure.*;
import java.util.Scanner;
public class App {
    public static void main(String[] args) {
        Scanner input = new Scanner(System.in);
        String no;
        LinkedList listKendaraan = new LinkedList();
        ElementList baru = new ElementList();
        ElementList cari = new ElementList();
        String cont = "Y";
        int pil;
        try{
        do
        {

            menu();

            pil = input.nextInt();

            clearScreen();


            switch(pil){

                case 1:

                    System.out.println("=== Metode
Penambahan ===");

                    System.out.println("1 . Insert
First");

                    System.out.println("2 . Insert
Last");

                    System.out.print("Masukkan
Pilihan....");

                    pil = input.nextInt();

                    clearScreen();


                    switch(pil){

                        case 1:

                        System.out.println("Data
ditambah dengan insert first...");

                        baru =
listKendaraan.createElmnt();


listKendaraan.insertFirst(baru);

                        break;



                        case 2:
```

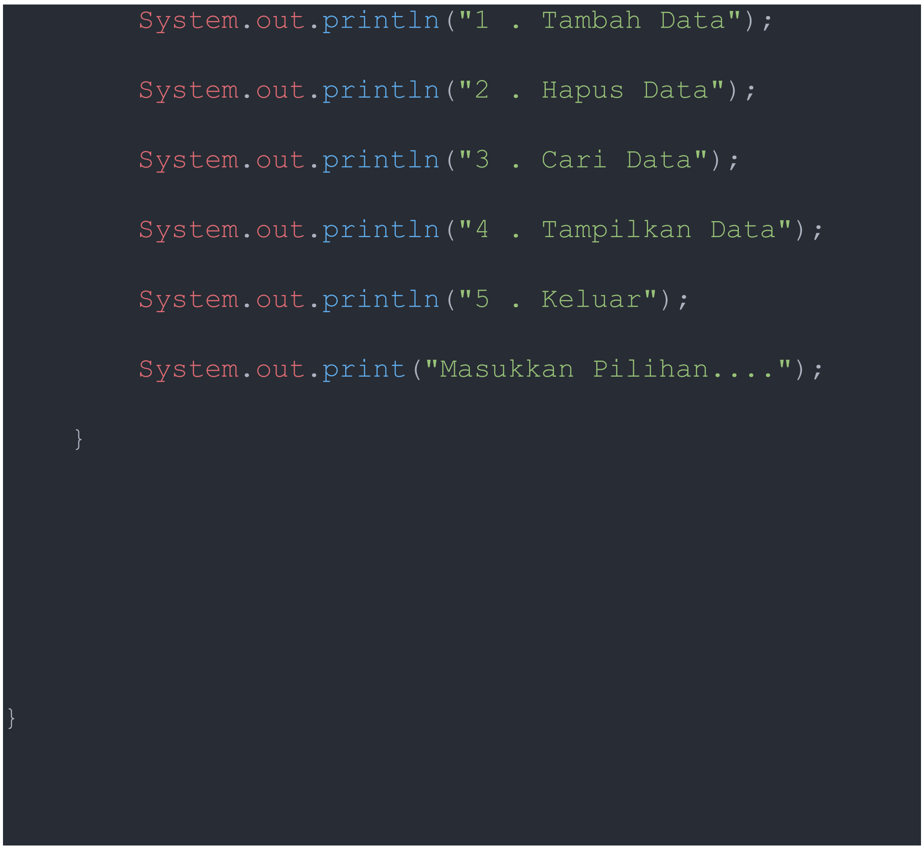
```
                        System.out.println("Data
ditambah dengan insert last...");
                        baru =
listKendaraan.createElmnt();

listKendaraan.insertLast(baru);
                        break;

                        default:
                        System.out.println("Bukan
Termasuk pilihan ! ");
                        break;
                    }

                    break;

                case 2:
                    System.out.println("=== Metode
Penghapusan ===");
                    System.out.println("1 . Delete
First");
                    System.out.println("2 . Delete
Last");
                    System.out.print("Masukkan
Pilihan....");
                    pil = input.nextInt();
                    clearScreen();

                    switch(pil){
                        case 1:
```

```
                        System.out.println("Data
dihapus dengan delete first...");
                        listKendaraan.deleteFirst();
                        break;

                        case 2:
                        System.out.println("Data
dihapus dengan delete last...");
                        listKendaraan.deleteLast();
                        break;

                        default:
                        System.out.println("Bukan
Termasuk pilihan ! ");
                        break;
                    }

                    break;

                case 3:
                    System.out.print("Masukkan Plat
nomor yang ingin dicari : ");
                    input.nextLine();
                    no = input.nextLine();
                    cari = listKendaraan.search(no);

                    if(cari == null){
                        System.out.println("Data Tidak
ditemukan ! ");
```

```
                }


                else{
                    System.out.println("Data Ditemukan , Detail : ");
                    cari.getData().getKendaraan();
                }
                break;


            case 4:
                listKendaraan.printData();
                System.out.println( "Total Biaya parkir = " + listKendaraan.totalBiaya());


                break;
            case 5:
                cont ="N";
                break;


            default:
                System.out.println("Bukan termasuk Pilihan ! ");
                break;
        }
        if(pil!=5){
        System.out.println("\n\nApakah program masih ingin dilanjutkan ? (Y/N)");
        cont = input.next();
```

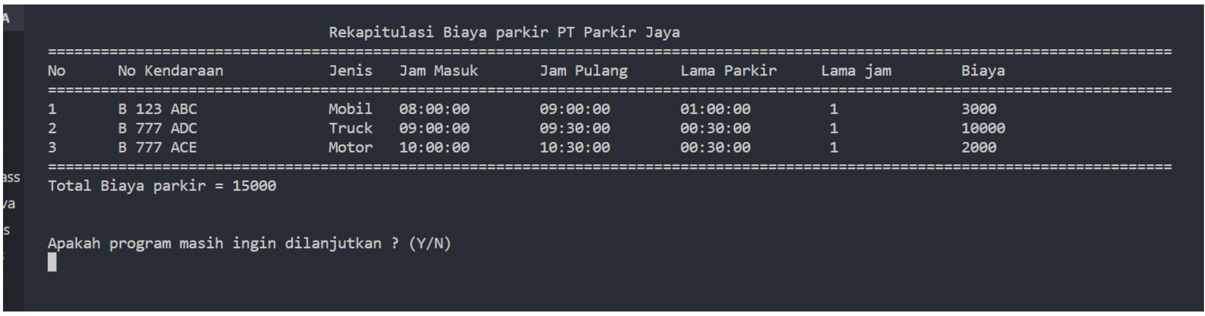


```
            clearScreen();
            }



        }while(cont.compareTo("Y") == 0);

        System.out.println("=== TERIMA KASIH ===");
    }

    catch(Exception e){
        System.out.println("Terdapat suatu error pada 
input...program diakhiri");
    }

    finally{
        input.close();
    }


    }


    static void clearScreen(){
        System.out.print("\033[H\033[2J");
        System.out.flush();
    }

    static void menu(){
        System.out.println("===== MENU =====");
```



```
        System.out.println("1 . Tambah Data");

        System.out.println("2 . Hapus Data");

        System.out.println("3 . Cari Data");

        System.out.println("4 . Tampilkan Data");

        System.out.println("5 . Keluar");

        System.out.print("Masukkan Pilihan....");

    }






}
```

b. Screenshot



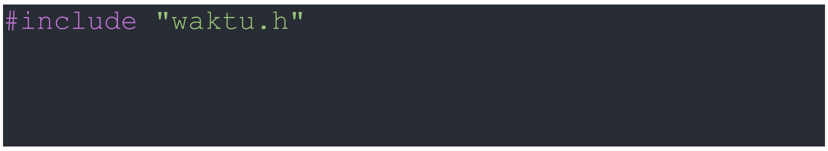
```
                                Rekapitulasi Biaya parkir PT Parkir Jaya
================================================================================================================================
No      No Kendaraan            Jenis   Jam Masuk       Jam Pulang      Lama Parkir     Lama jam        Biaya
================================================================================================================================
1       B 123 ABC               Mobil   08:00:00        09:00:00        01:00:00         1              3000
2       B 777 ADC               Truck   09:00:00        09:30:00        00:30:00         1              10000
3       B 777 ACE               Motor   10:00:00        10:30:00        00:30:00         1              2000
================================================================================================================================
Total Biaya parkir = 15000


Apakah program masih ingin dilanjutkan ? (Y/N)
█
```

2. CPP

   a. Source code

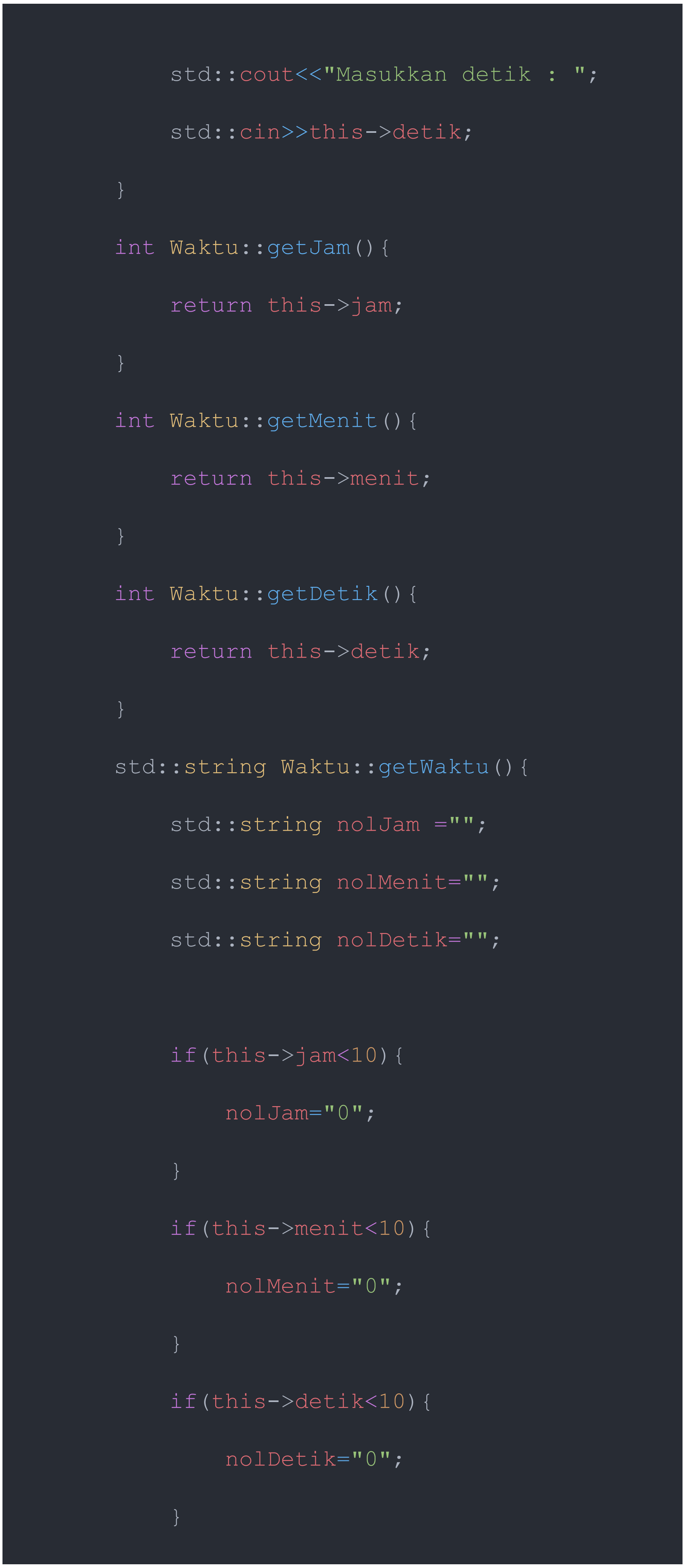
      i. Class waktu

         1. Header



```
#include "waktu.h"
```

```
        Waktu::Waktu(int jam,int menit,int
detik){
            this->jam = jam;
            this->menit = menit;
            this->detik = detik;
        }
        Waktu::Waktu(){
            this->jam = 0;
            this->menit =0;
            this->detik=0;
        }
        void Waktu::setJam(int jam){
            this->jam = jam;
        }
        void Waktu::setMenit(int menit){
            this->menit = menit;
        }
        void Waktu::setDetik(int detik){
            this->detik = detik;
        }
        void Waktu::inputWaktu(){
            std::cout<<"Masukkan jam : ";
            std::cin>>this->jam;

            std::cout<<"Masukkan menit : ";
            std::cin>>this->menit;
```

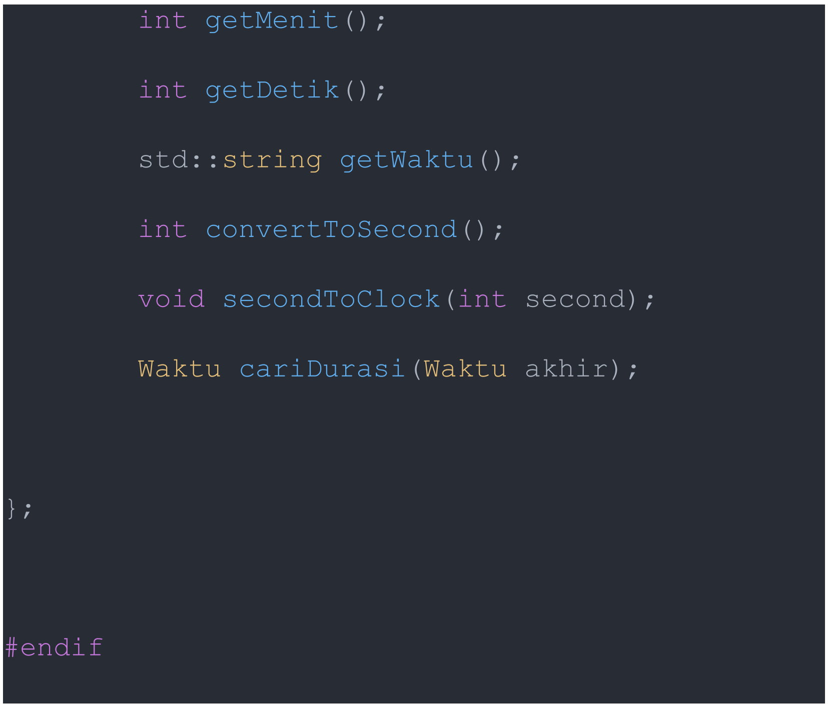


```
    std::cout<<"Masukkan detik : ";
    std::cin>>this->detik;
}
int Waktu::getJam(){
    return this->jam;
}
int Waktu::getMenit(){
    return this->menit;
}
int Waktu::getDetik(){
    return this->detik;
}
std::string Waktu::getWaktu(){
    std::string nolJam ="";
    std::string nolMenit="";
    std::string nolDetik="";

    if(this->jam<10){
        nolJam="0";
    }
    if(this->menit<10){
        nolMenit="0";
    }
    if(this->detik<10){
        nolDetik="0";
    }
```

```
            return nolJam +
std::to_string(this->jam) + ":" + nolMenit+
std::to_string(this->menit) + ":" +nolDetik+
std::to_string(this->detik);

        }

        int Waktu::convertToSecond(){

            int hasil = this->detik +
this->menit*60 + this->jam*3600;

            return hasil;

        }

        void Waktu::secondToClock(int second){

            this->menit=second/60;

            this->detik=second%60;

            this->jam=this->menit/60;

            this->menit=this->menit%60;

        }

        Waktu Waktu::cariDurasi(Waktu akhir){

             Waktu temp;


            int detikAwal =
this->convertToSecond();

            int detikAkhir =
akhir.convertToSecond();

            if(detikAkhir<detikAwal){

                detikAkhir+=86400;

            }
            int detikHasil = detikAkhir - detikAwal;





            temp.secondToClock(detikHasil);

            return temp;

        }
```

2. Implementasi

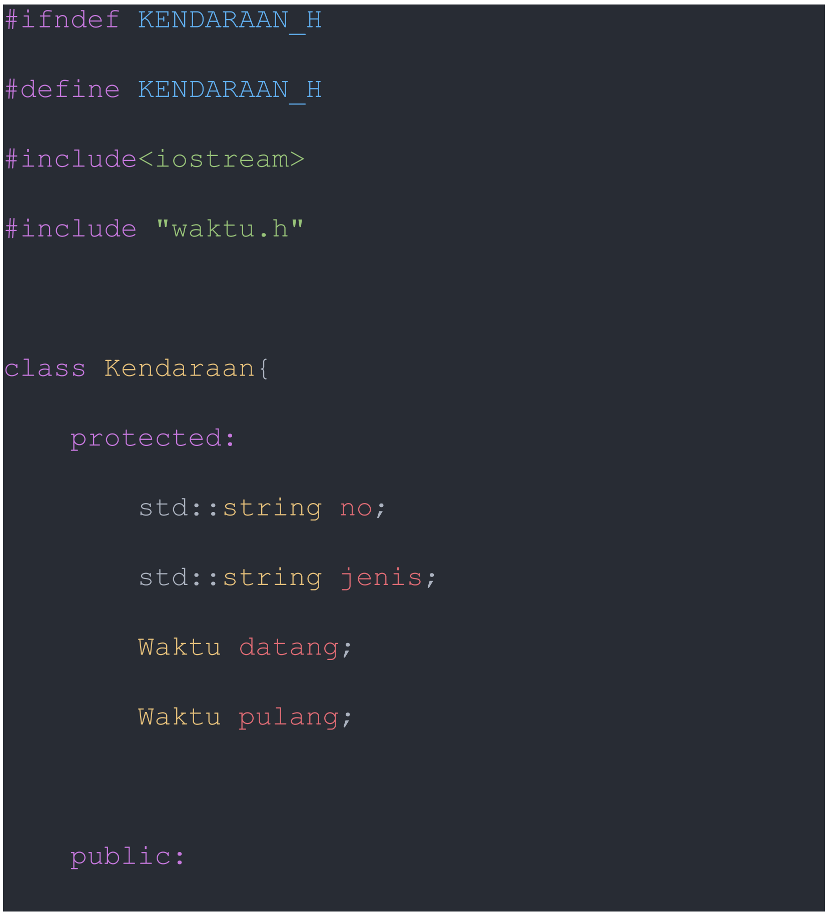
```
#ifndef WAKTU_H

#define WAKTU_H


#include<iostream>

class Waktu{

    private:

        int jam,menit,detik;

     public:

        Waktu(int jam,int menit,int detik);

        Waktu();

        void setJam(int jam);

        void setMenit(int menit);

        void setDetik(int detik);

        void inputWaktu();

        int getJam();
```



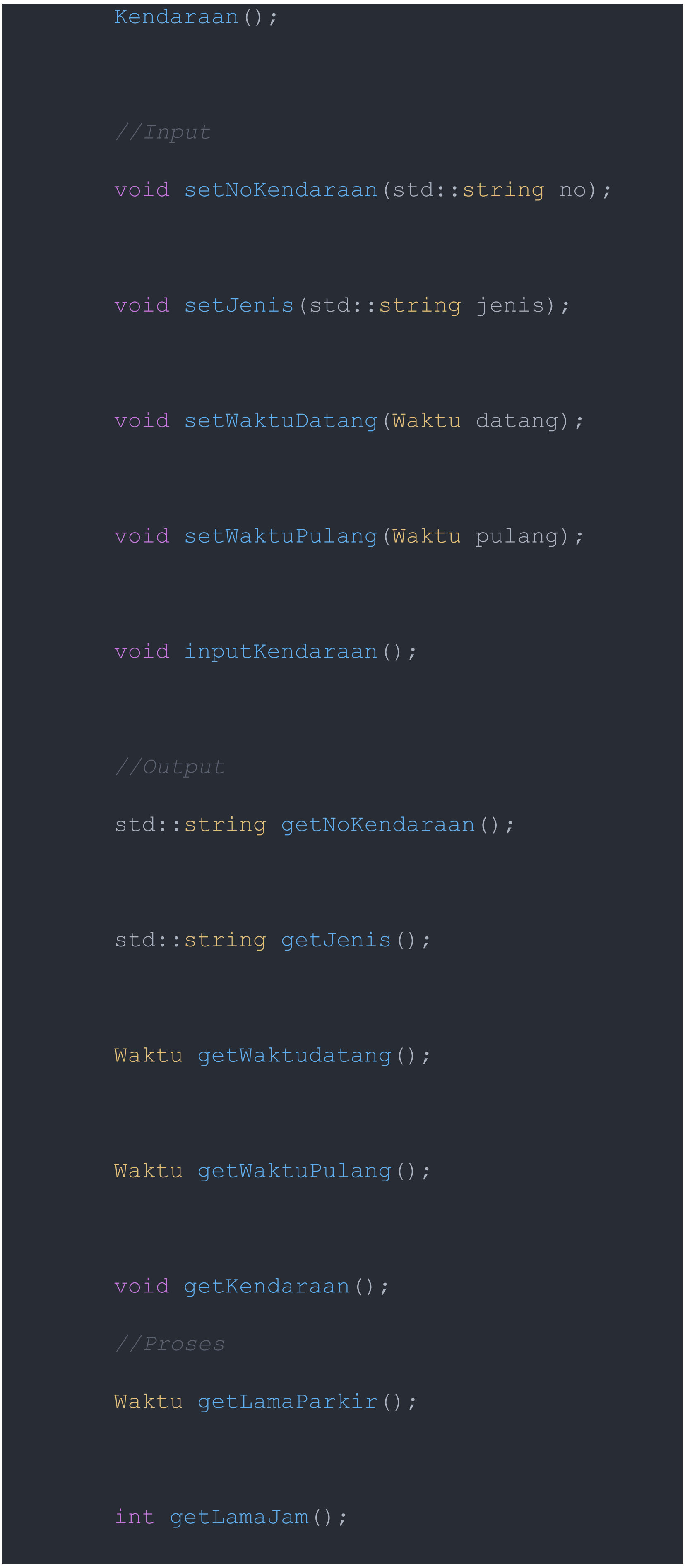
```
        int getMenit();

        int getDetik();

        std::string getWaktu();

        int convertToSecond();

        void secondToClock(int second);

        Waktu cariDurasi(Waktu akhir);


};


#endif
```

ii. Class Kendaraan

1. Header



```
#ifndef KENDARAAN_H

#define KENDARAAN_H

#include<iostream>

#include "waktu.h"


class Kendaraan{

    protected:

        std::string no;

        std::string jenis;

        Waktu datang;

        Waktu pulang;


    public:
```



```
    Kendaraan();


    //Input
    void setNoKendaraan(std::string no);

    void setJenis(std::string jenis);

    void setWaktuDatang(Waktu datang);

    void setWaktuPulang(Waktu pulang);

    void inputKendaraan();


    //Output
    std::string getNoKendaraan();

    std::string getJenis();

    Waktu getWaktudatang();

    Waktu getWaktuPulang();

    void getKendaraan();
    //Proses
    Waktu getLamaParkir();

    int getLamaJam();
```

```
        virtual int getBiayaParkir();



};


#endif
```

2. Implementasi

```
#include "Kendaraan.h"


        Kendaraan::Kendaraan(){

            this->no = " ";


        }


        //Input

        void
Kendaraan::setNoKendaraan(std::string no){

            this->no = no;

        }


        void Kendaraan::setJenis(std::string
jenis){

            this->jenis = jenis;

        }
        void Kendaraan::setWaktuDatang(Waktu datang){
            this->datang = datang;


        }


        void Kendaraan::setWaktuPulang(Waktu pulang){
            this->pulang=pulang;
        }


        void Kendaraan::inputKendaraan(){
            std::cout<<"\n--- INPUT KENDARAAN ---\n";
            std::cout<<"No Kendaraan : ";
            std::cin.ignore();
            std::getline(std::cin,this->no);


            std::cout<<"\n-- Jam Masuk Kendaraan --\n";
            this->datang.inputWaktu();


            std::cout<<"\n-- Jam Keluar Kendaraan --\n";
            this->pulang.inputWaktu();
        }


        //Output
        std::string Kendaraan::getNoKendaraan(){
            return this->no;

        }


        std::string Kendaraan::getJenis(){

            return this->jenis;

        }


        Waktu Kendaraan::getWaktudatang(){

            return this->datang;

        }


        Waktu Kendaraan::getWaktuPulang(){

            return this->pulang;

        }


        //Proses

        Waktu Kendaraan::getLamaParkir(){

            return
this->datang.cariDurasi(this->pulang);

        }


        int Kendaraan::getLamaJam(){

        int hasil = 0;


if(this->getLamaParkir().getMenit()>=10 ||
this->getLamaParkir().getJam()>=1){

                hasil =
this->getLamaParkir().getJam();
```

```
                if( this->getLamaParkir().getMenit()>0 || this->getLamaParkir().getDetik()>0 ){

                    hasil +=1;

                }



            }

            return hasil;

        }



        void Kendaraan::getKendaraan(){

            std::cout<<"No kendaraan = " << this->no<<"\n";

            std::cout<<"Jenis = " << this->jenis<<"\n";

            std::cout<<"Jam Masuk = " << this->getWaktudatang().getWaktu()<<"\n";

            std::cout<<"Jam Pulang = " << this->getWaktuPulang().getWaktu()<<"\n";

            std::cout<<"Lama Parkir = "<<this->getLamaParkir().getWaktu()<<"\n";

            std::cout<<"Lama jam = " << this->getLamaJam()<<"\n";

            std::cout<<"Biaya = " << this->getBiayaParkir();

        }



        int Kendaraan::getBiayaParkir(){return 0;}
```

iii. Class Mobil

1. Header

```
#ifndef MOBIL_H
#define MOBIL_H

#include "Kendaraan.h"
class Mobil : public Kendaraan{
    public:

Mobil():Kendaraan(){this->jenis="Mobil";};
        int getBiayaParkir();
};

#endif
```

2. Implementasi

```
#include "Mobil.h"
int Mobil::getBiayaParkir(){
            return this->getLamaJam()*3000;
}
```

iv. Class Motor

1. Header

```
#ifndef MOTOR_H
#define MOTOR_H
```

```
#include "Kendaraan.h"

class Motor : public Kendaraan{
    public:
        Motor():Kendaraan(){
            this->jenis="Motor";
        }

        int getBiayaParkir();
};

#endif
```

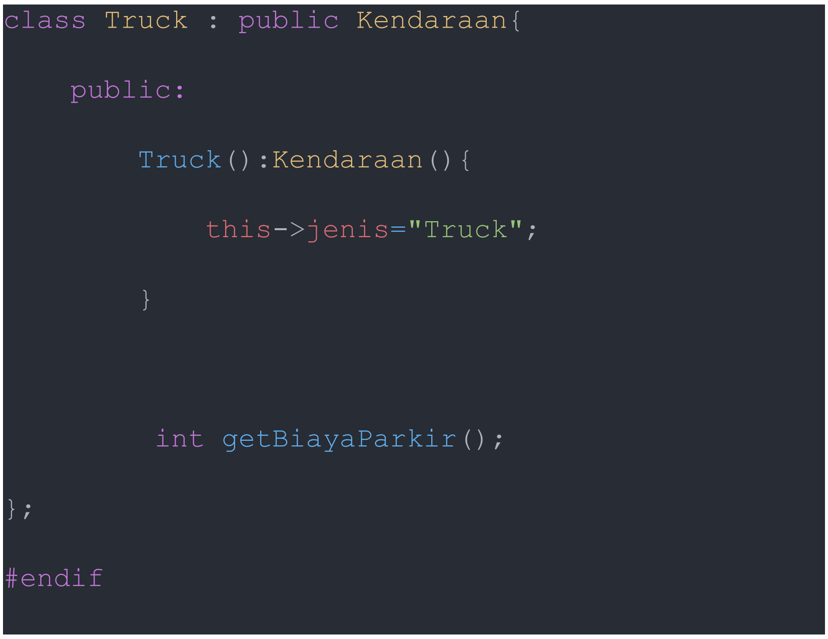
2. Implementasi

```
#include "Motor.h"

int Motor::getBiayaParkir(){
    return this->getLamaJam()*2000;
 }
```

v. Class Truck

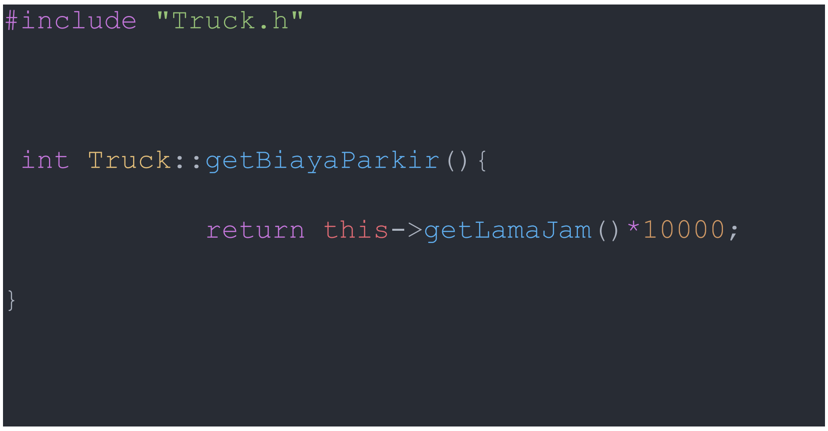
1. Header

```
#ifndef TRUCK_H
#define TRUCK_H

#include "Kendaraan.h"
```



```
class Truck : public Kendaraan{

    public:

        Truck():Kendaraan(){

            this->jenis="Truck";

        }


         int getBiayaParkir();

};

#endif
```

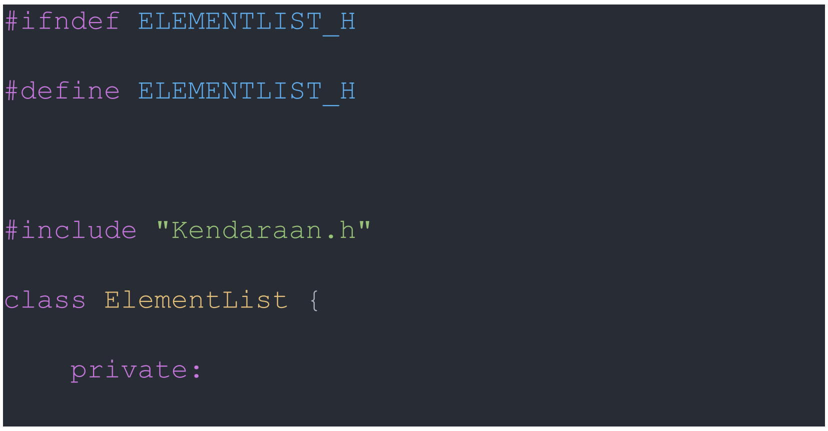
2. Implementasi



```
#include "Truck.h"


 int Truck::getBiayaParkir(){

            return this->getLamaJam()*10000;

}
```

vi. Class Element List

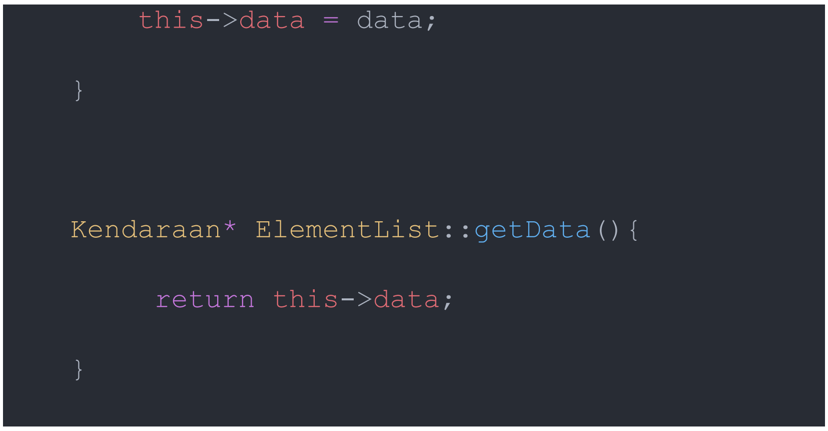
1. Header



```
#ifndef ELEMENTLIST_H

#define ELEMENTLIST_H


#include "Kendaraan.h"

class ElementList {

    private:
        Kendaraan *data;

    public:

        ElementList *next;

        ElementList();

        ElementList(Kendaraan *data);

        void setData(Kendaraan *data);

        Kendaraan* getData();


};


#endif
```

2. Implementasi

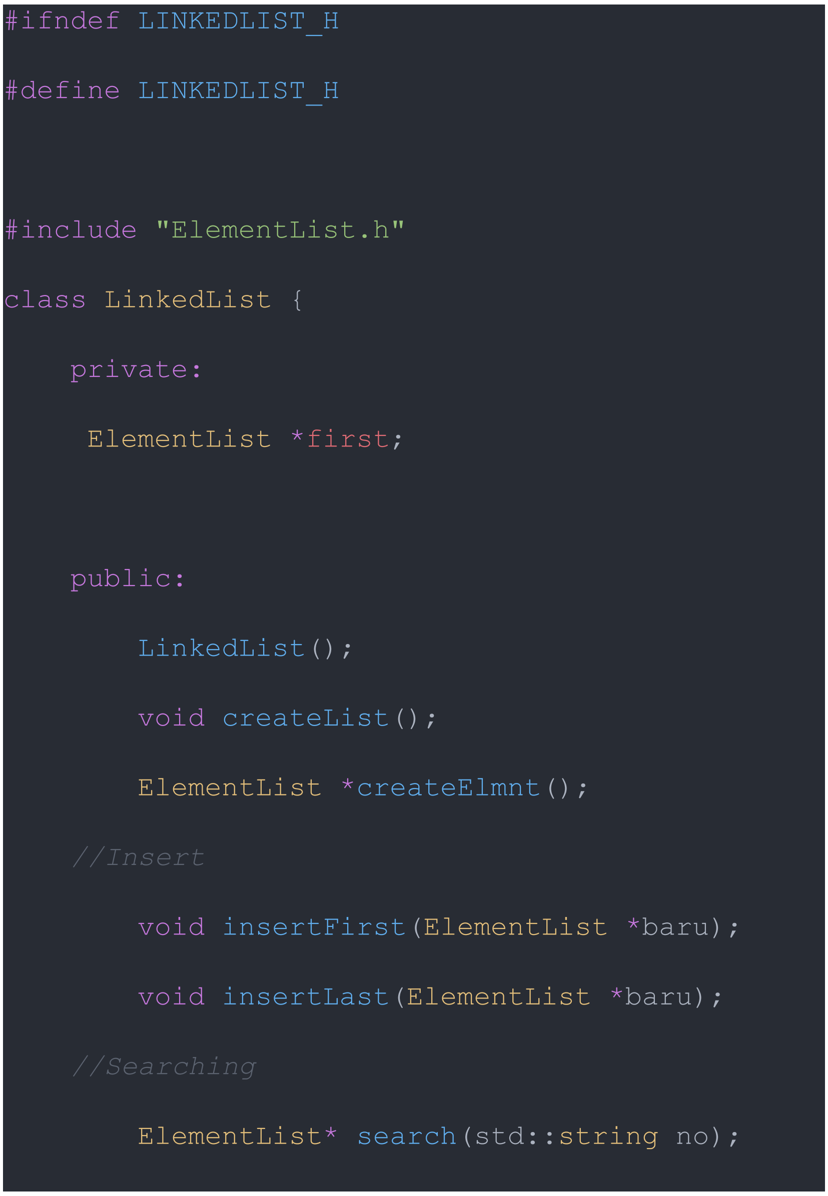
```
#include "ElementList.h"


 ElementList::ElementList(){


        this->next = nullptr;

    }


ElementList::ElementList(Kendaraan *data){

        this->data = data;

        this->next = nullptr;

    }


     void  ElementList::setData(Kendaraan
*data){
```



```
        this->data = data;
    }

    Kendaraan* ElementList::getData(){
         return this->data;
    }
```

vii. Class linked list

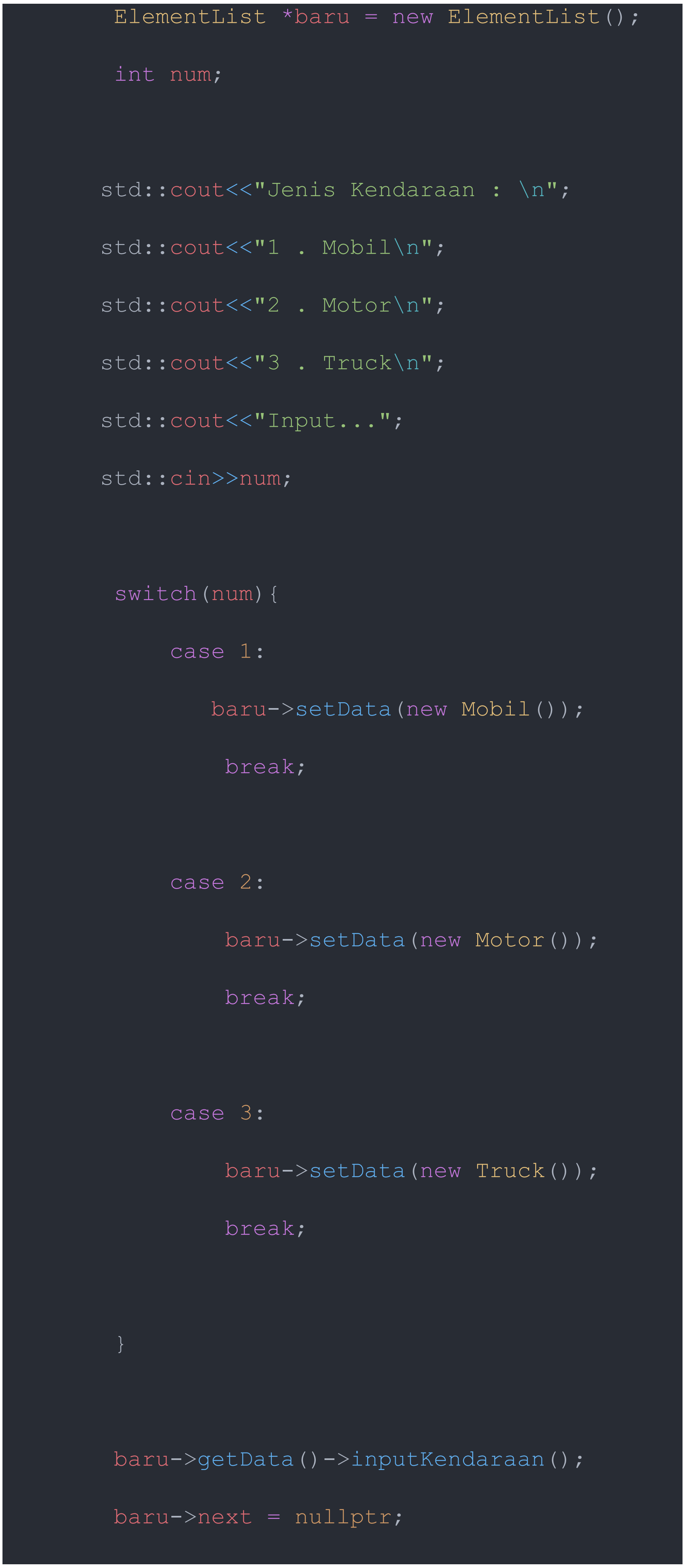
1. Header



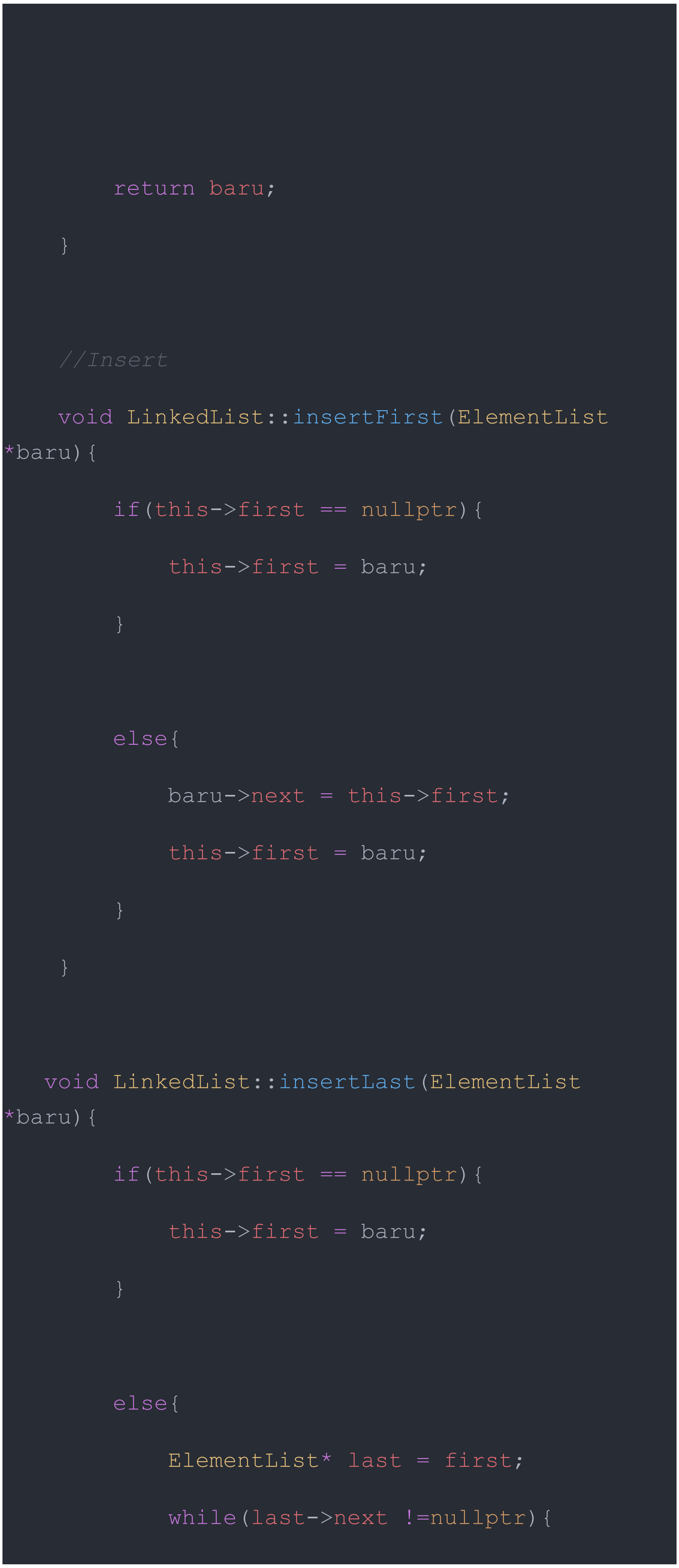
```
#ifndef LINKEDLIST_H
#define LINKEDLIST_H

#include "ElementList.h"
class LinkedList {
    private:
     ElementList *first;

    public:
        LinkedList();
        void createList();
        ElementList *createElmnt();
    //Insert
        void insertFirst(ElementList *baru);
        void insertLast(ElementList *baru);
    //Searching
        ElementList* search(std::string no);
    //Delete

        void deleteFirst();

        void deleteLast();

    //Traversal

        void printData();

        int totalBiaya();

};


#endif
```

2. Implementasi

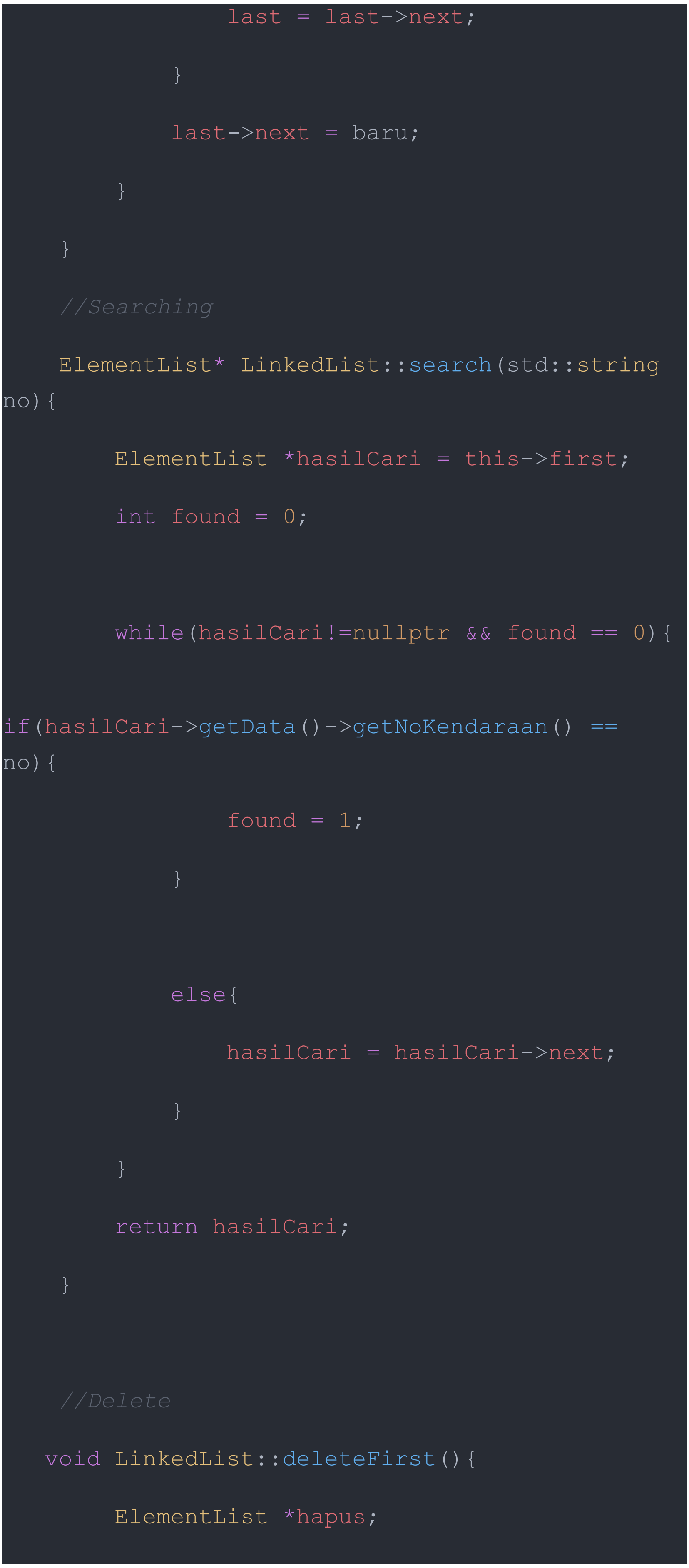
```
#include "LinkedList.h"

#include "Motor.h"

#include "Mobil.h"

#include "Motor.h"

#include "Truck.h"


  LinkedList::LinkedList(){

        this->first = nullptr;

    }


    void LinkedList::createList(){

        this->first = nullptr;

    }


    ElementList* LinkedList::createElmnt(){
```



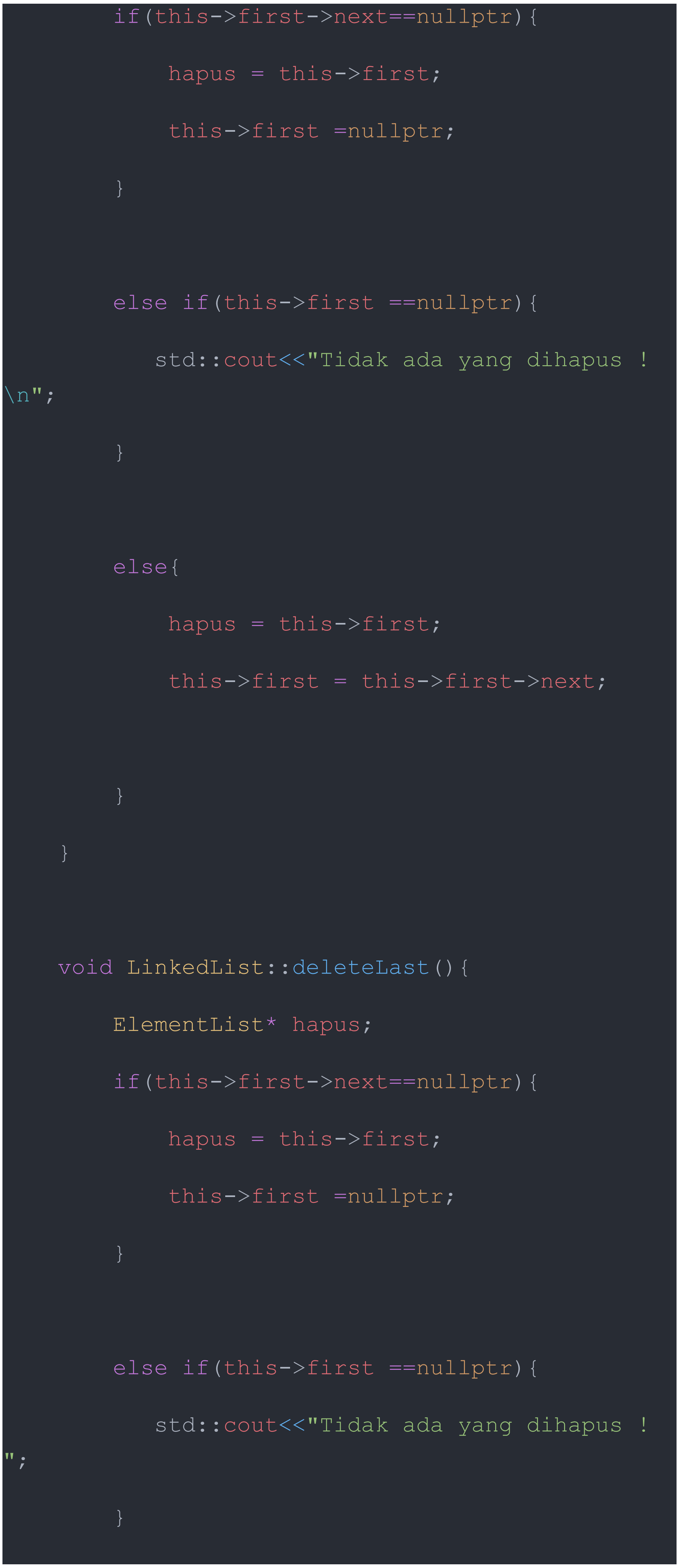
```
 ElementList *baru = new ElementList();

 int num;


std::cout<<"Jenis Kendaraan : \n";

std::cout<<"1 . Mobil\n";

std::cout<<"2 . Motor\n";

std::cout<<"3 . Truck\n";

std::cout<<"Input...";

std::cin>>num;


 switch(num){

     case 1:

        baru->setData(new Mobil());

         break;


     case 2:

         baru->setData(new Motor());

         break;


     case 3:

         baru->setData(new Truck());

         break;


 }


 baru->getData()->inputKendaraan();

 baru->next = nullptr;
```



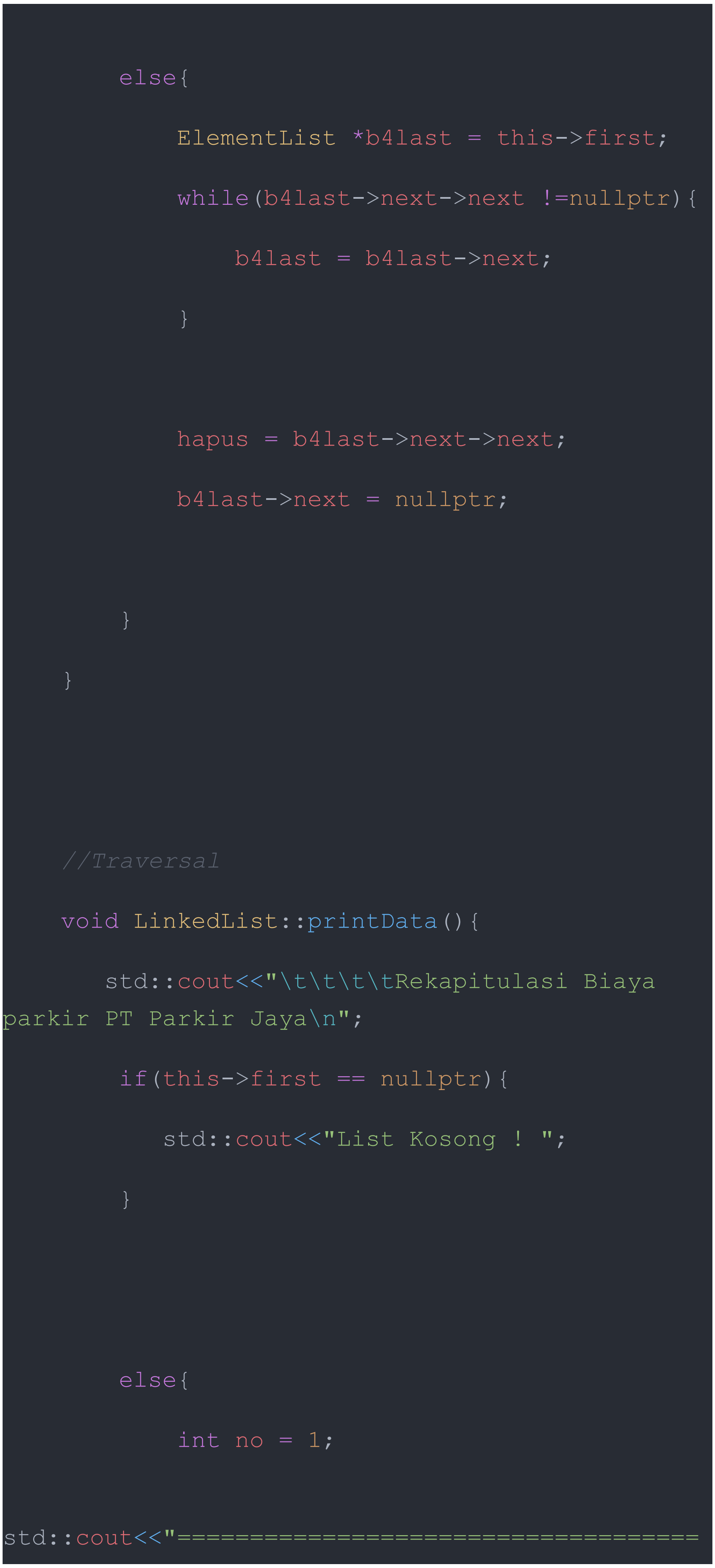
```
        return baru;
    }

    //Insert
    void LinkedList::insertFirst(ElementList
*baru){
        if(this->first == nullptr){
            this->first = baru;
        }

        else{
            baru->next = this->first;
            this->first = baru;
        }
    }

   void LinkedList::insertLast(ElementList
*baru){
        if(this->first == nullptr){
            this->first = baru;
        }

        else{
            ElementList* last = first;
            while(last->next !=nullptr){
```



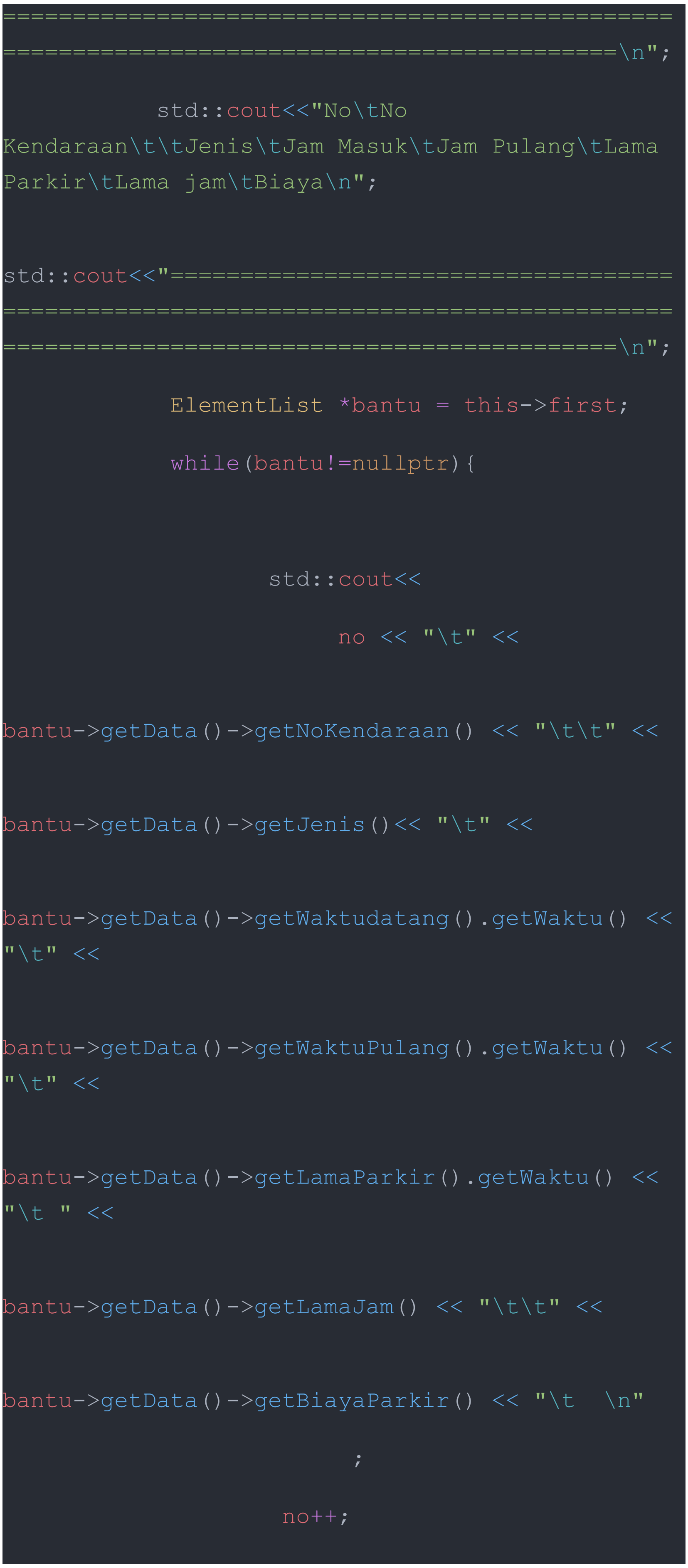
```
                last = last->next;
            }
            last->next = baru;
        }
    }
    //Searching
    ElementList* LinkedList::search(std::string
no){
        ElementList *hasilCari = this->first;
        int found = 0;

        while(hasilCari!=nullptr && found == 0){

if(hasilCari->getData()->getNoKendaraan() ==
no){
                found = 1;
            }

            else{
                hasilCari = hasilCari->next;
            }
        }
        return hasilCari;
    }

    //Delete
   void LinkedList::deleteFirst(){
        ElementList *hapus;
```



```
        if(this->first->next==nullptr){

            hapus = this->first;

            this->first =nullptr;

        }


        else if(this->first ==nullptr){

           std::cout<<"Tidak ada yang dihapus !
\n";

        }


        else{

            hapus = this->first;

            this->first = this->first->next;


        }

    }


    void LinkedList::deleteLast(){

        ElementList* hapus;

        if(this->first->next==nullptr){

            hapus = this->first;

            this->first =nullptr;

        }


        else if(this->first ==nullptr){

           std::cout<<"Tidak ada yang dihapus !
";

        }
```



```
        else{
            ElementList *b4last = this->first;
            while(b4last->next->next !=nullptr){
                b4last = b4last->next;
            }

            hapus = b4last->next->next;
            b4last->next = nullptr;

        }
    }



    //Traversal
    void LinkedList::printData(){
       std::cout<<"\t\t\t\tRekapitulasi Biaya
parkir PT Parkir Jaya\n";
        if(this->first == nullptr){
           std::cout<<"List Kosong ! ";
        }



        else{
            int no = 1;

std::cout<<"====================================
```



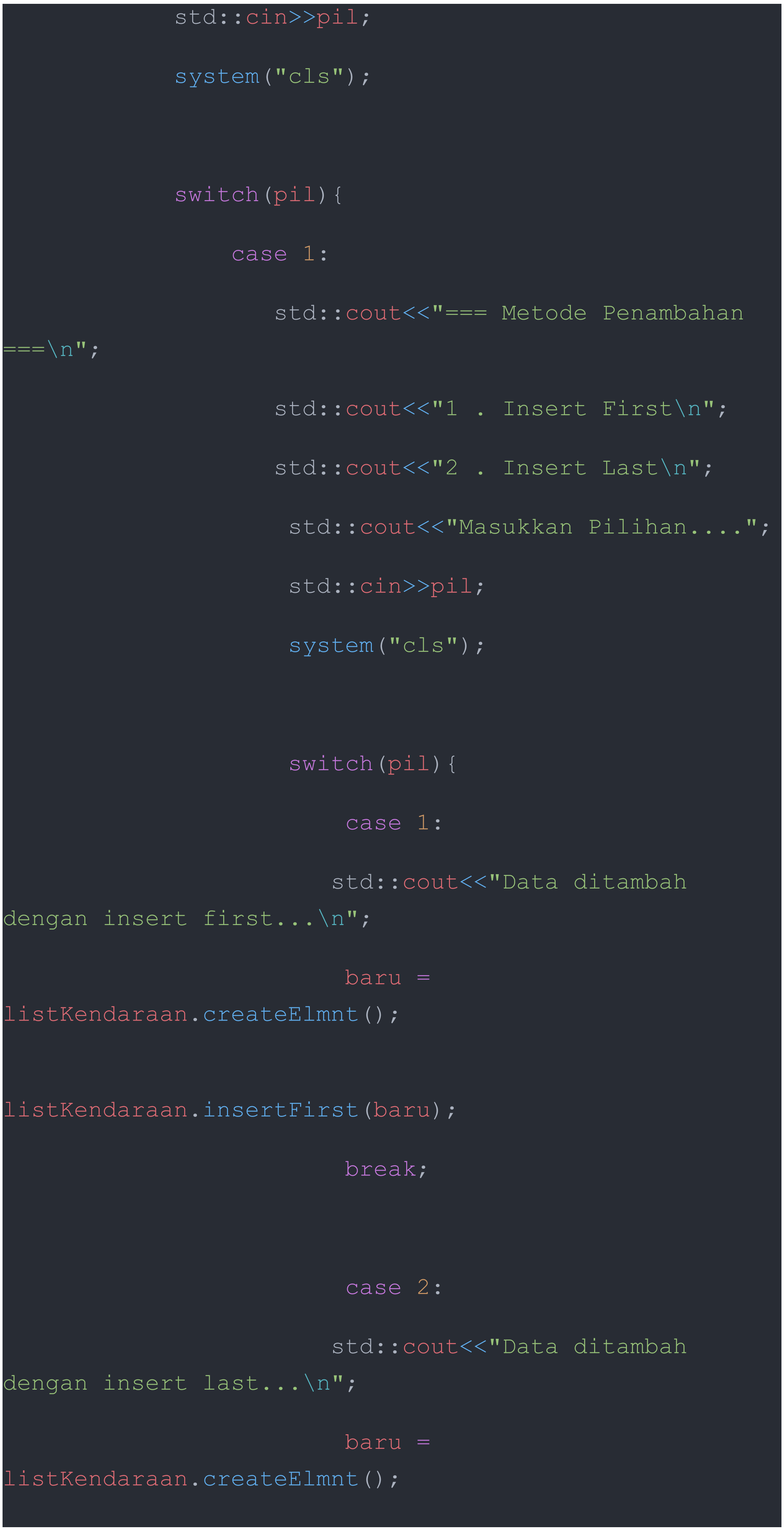
```
============================================
=========================================\n";

          std::cout<<"No\tNo
Kendaraan\t\tJenis\tJam Masuk\tJam Pulang\tLama
Parkir\tLama jam\tBiaya\n";


std::cout<<"=================================
============================================
=========================================\n";

           ElementList *bantu = this->first;

           while(bantu!=nullptr){


                  std::cout<<

                       no << "\t" <<


bantu->getData()->getNoKendaraan() << "\t\t" <<


bantu->getData()->getJenis()<< "\t" <<


bantu->getData()->getWaktudatang().getWaktu() <<
"\t" <<


bantu->getData()->getWaktuPulang().getWaktu() <<
"\t" <<


bantu->getData()->getLamaParkir().getWaktu() <<
"\t " <<


bantu->getData()->getLamaJam() << "\t\t" <<


bantu->getData()->getBiayaParkir() << "\t  \n"

                        ;

                   no++;
```

```
                    bantu = bantu->next;

            }




std::cout<<"====================================
================================================
============================================\n";


        }

    }


    int LinkedList::totalBiaya(){

        int hasil = 0;


          ElementList *bantu = this->first;

            while(bantu!=nullptr){

                hasil
+=bantu->getData()->getBiayaParkir();

                bantu = bantu->next;

            }


        return hasil;




    }
```

viii. Program main

```cpp
/*
* Nama     : Amir Salim , Andre Nathaniel Adipraja , Prames Ray lapian , Ibrahim Dafi Iskandar
* NPM      : 140810210015 , 140810200042 , 140810210059 , 140810210039
* Kelas : A
* Tanggal : 11 November 2022
* Nama Program : Main.cpp
* Deskripsi :  Program Main cpp
*/
#include "waktu.h"
#include "waktu.cpp"
#include "Kendaraan.h"
#include "Kendaraan.cpp"
#include "LinkedList.h"
#include "LinkedList.cpp"
#include "ElementList.h"
#include "ElementList.cpp"
#include "Motor.h"
#include "Motor.cpp"
#include "Mobil.h"
#include "Mobil.cpp"
#include "Truck.h"
#include "Truck.cpp"
```

```cpp
#include <iostream>

 void menu(){
        std::cout<<"===== MENU =====\n";
        std::cout<<"1 . Tambah Data\n";
        std::cout<<"2 . Hapus Data\n";
        std::cout<<"3 . Cari Data\n";
        std::cout<<"4 . Tampilkan Data\n";
        std::cout<<"5 . Keluar\n";
        std::cout<<"Masukkan Pilihan....\n";
    }

int main()
{
    ElementList *baru = new ElementList();
    ElementList *cari = new ElementList();
    LinkedList listKendaraan;
    listKendaraan.createList();
    int pil;
    std::string no;
    std::string cont ="Y";
try{
    do
        {
            menu();
```

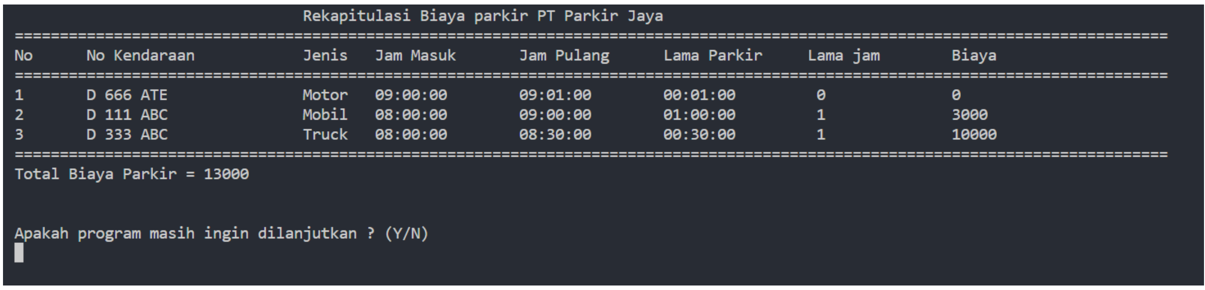


```
            std::cin>>pil;

            system("cls");


            switch(pil){

                case 1:

                   std::cout<<"=== Metode Penambahan
===\n";

                   std::cout<<"1 . Insert First\n";

                   std::cout<<"2 . Insert Last\n";

                    std::cout<<"Masukkan Pilihan....";

                    std::cin>>pil;

                    system("cls");


                    switch(pil){

                        case 1:

                       std::cout<<"Data ditambah
dengan insert first...\n";

                        baru =
listKendaraan.createElmnt();


listKendaraan.insertFirst(baru);

                        break;



                        case 2:

                       std::cout<<"Data ditambah
dengan insert last...\n";

                        baru =
listKendaraan.createElmnt();
listKendaraan.insertLast(baru);
                        break;

                        default:
                       std::cout<<"Bukan Termasuk pilihan ! \n";
                        break;
                    }

                    break;

                case 2:
                   std::cout<<"=== Metode Penghapusan ===\n";
                   std::cout<<"1 . Delete First\n";
                   std::cout<<"2 . Delete Last\n";
                    std::cout<<"Masukkan Pilihan....";
                    std::cin>>pil;
                    system("cls");

                    switch(pil){
                        case 1:
                       std::cout<<"Data dihapus dengan delete first...\n";
                        listKendaraan.deleteFirst();
                        break;
                        case 2:
                       std::cout<<"Data dihapus dengan
delete last...\n";
                        listKendaraan.deleteLast();
                        break;

                        default:
                       std::cout<<"Bukan Termasuk
pilihan ! \n";
                        break;
                    }

                    break;

                case 3:
                    std::cout<<"Masukkan Plat nomor
yang ingin dicari : ";
                   std::cin.ignore();
                    std::getline(std::cin,no);
                    cari = listKendaraan.search(no);

                    if(cari == nullptr){
                       std::cout<<"Data Tidak
ditemukan ! \n";
                    }

                    else{
                       std::cout<<"Data Ditemukan ,
Detail : \n";
```

```
cari->getData()->getKendaraan();
                    }
                    break;

                case 4:
                    listKendaraan.printData();
                    std::cout<<"Total Biaya Parkir = "<<listKendaraan.totalBiaya()<<"\n";
                    break;
                case 5:
                    cont ="N";
                    break;

                default:
                   std::cout<<"Bukan termasuk Pilihan ! \n";
                    break;
            }
            if(pil!=5){
           std::cout<<"\n\nApakah program masih ingin dilanjutkan ? (Y/N)\n";
            std::cin>>cont;
            system("cls");
            }



        }while(cont == "Y");
```

```
}





catch(...){

    std::cout<<"Terdapat error...";

}

    std::cout<<"=== TERIMA KASIH ===";



}
```

b. Screenshot



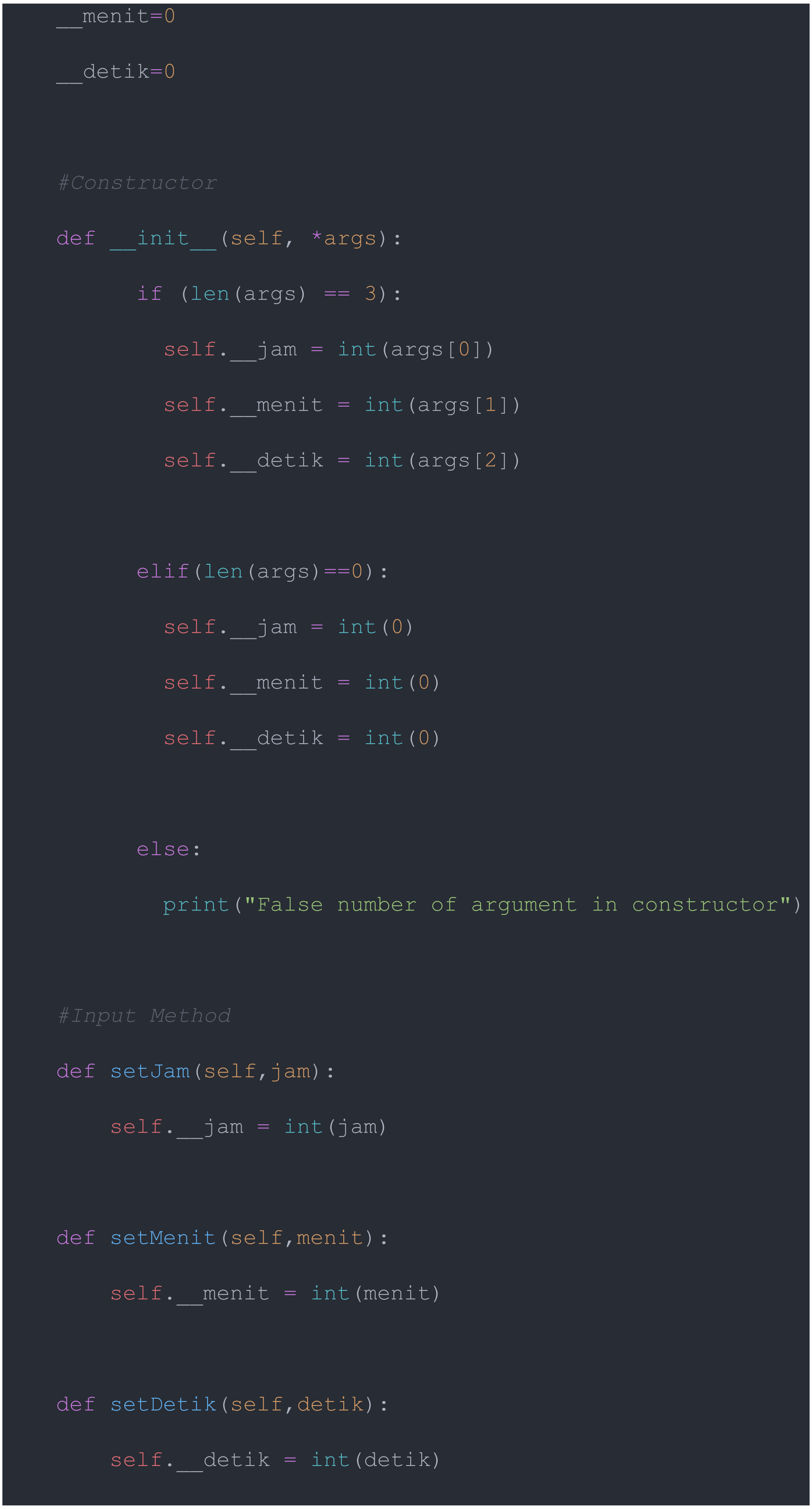
```
                                Rekapitulasi Biaya parkir PT Parkir Jaya
================================================================================================================================
No      No Kendaraan            Jenis   Jam Masuk       Jam Pulang      Lama Parkir     Lama jam        Biaya
================================================================================================================================
1       D 666 ATE               Motor   09:00:00        09:01:00        00:01:00         0              0
2       D 111 ABC               Mobil   08:00:00        09:00:00        01:00:00         1              3000
3       D 333 ABC               Truck   08:00:00        08:30:00        00:30:00         1              10000
================================================================================================================================
Total Biaya Parkir = 13000


Apakah program masih ingin dilanjutkan ? (Y/N)
█
```

3. Python

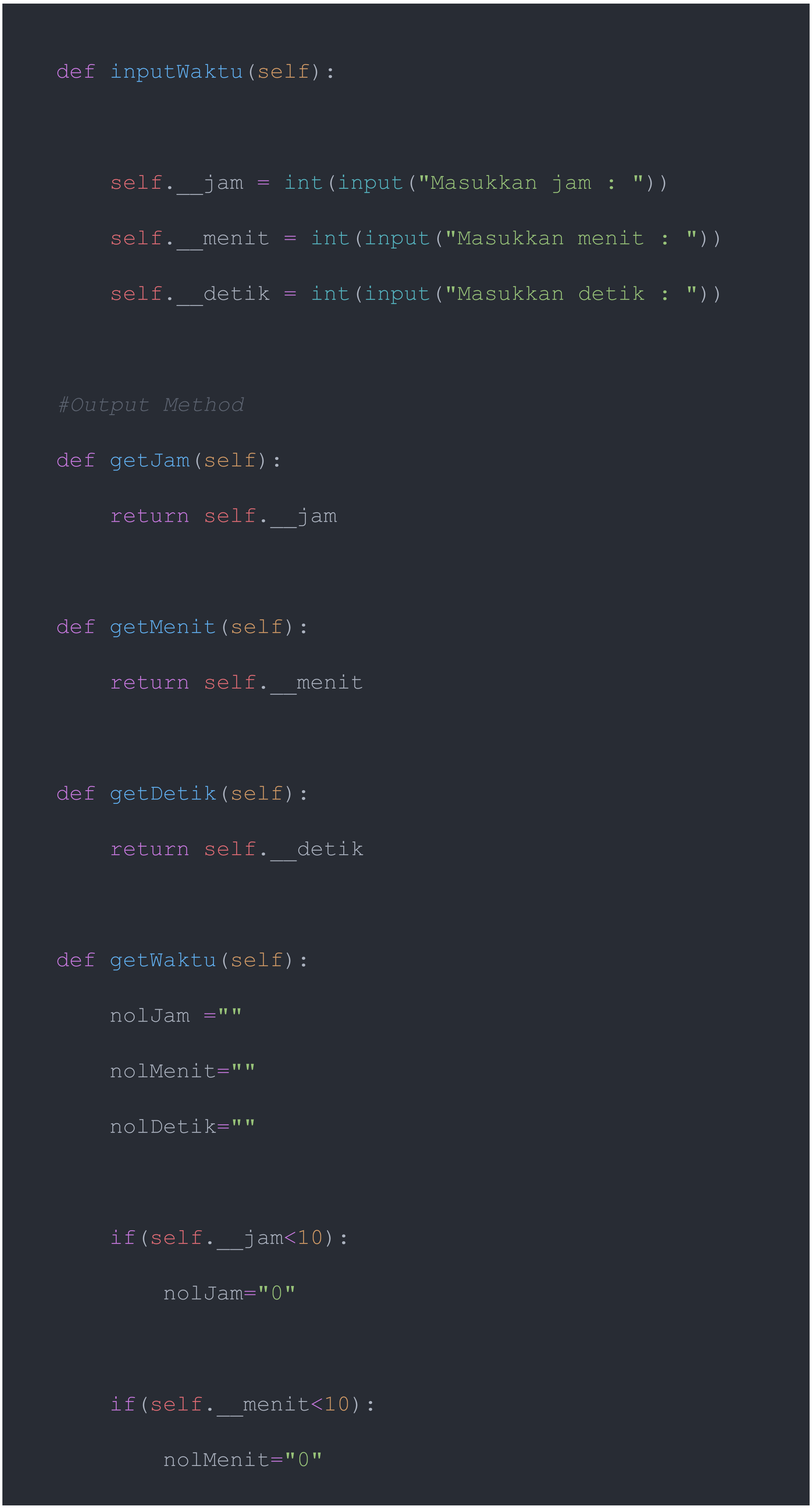
a. Source code

i. Class Waktu

```
class Waktu:


    #Attribute

    __jam=0
```



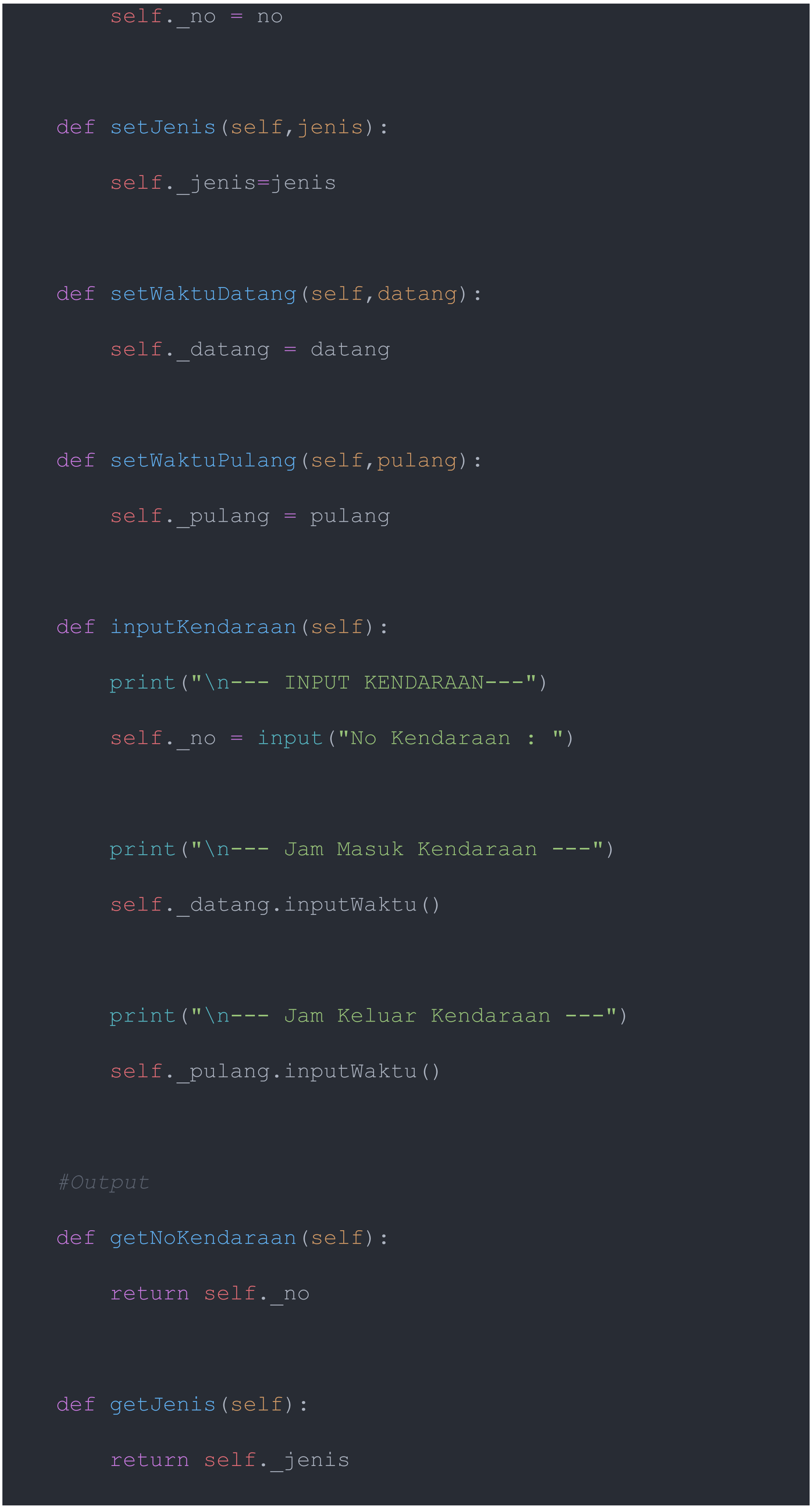
```
  __menit=0
  __detik=0

  #Constructor
  def __init__(self, *args):
     if (len(args) == 3):
      self.__jam = int(args[0])
      self.__menit = int(args[1])
      self.__detik = int(args[2])

     elif(len(args)==0):
      self.__jam = int(0)
      self.__menit = int(0)
      self.__detik = int(0)

     else:
      print("False number of argument in constructor")

  #Input Method
  def setJam(self,jam):
    self.__jam = int(jam)

  def setMenit(self,menit):
    self.__menit = int(menit)

  def setDetik(self,detik):
    self.__detik = int(detik)
```



```
def inputWaktu(self):

    self.__jam = int(input("Masukkan jam : "))
    self.__menit = int(input("Masukkan menit : "))
    self.__detik = int(input("Masukkan detik : "))

#Output Method
def getJam(self):
    return self.__jam

def getMenit(self):
    return self.__menit

def getDetik(self):
    return self.__detik

def getWaktu(self):
    nolJam =""
    nolMenit=""
    nolDetik=""

    if(self.__jam<10):
        nolJam="0"

    if(self.__menit<10):
        nolMenit="0"
    if(self.__detik<10):
        nolDetik="0"

    return nolJam + str(self.__jam) + ":" + str(nolMenit)+ str(self.__menit) + ":" +nolDetik+ str(self.__detik)

#Proses

def convertToSecond(self):
    hasil = self.__detik + (int(60) * self.__menit) + (int(3600) * self.__jam)
    return hasil

def secondToClock(self,second:int):
    self.__menit = int(second/60)
    self.__detik = int(second%60)
    self.__jam = int(self.__menit/60)
    self.__menit = int(self.__menit%60)

def cariDurasi(self,akhir):
    temp = Waktu()

    detikAwal = self.convertToSecond()
    detikAkhir = akhir.convertToSecond()

    if(detikAkhir<detikAwal):
        detikAkhir+=86400

    detikHasil = detikAkhir - detikAwal
    temp.secondToClock(detikHasil)

    return temp

```

ii. Class Kendaraan

```
from Waktu import Waktu
class Kendaraan:
    _no = " "
    _jenis= " "
    _datang = Waktu()
    _pulang = Waktu()

    #Constructor
    def __init__(self):
        self._no = " "
        self._jenis = " "
        self._datang = Waktu(0,0,0)
        self._pulang = Waktu(0,0,0)


    #Input
    def setNoKendaraan(self,no):
```



```
        self._no = no


    def setJenis(self,jenis):

        self._jenis=jenis


    def setWaktuDatang(self,datang):

        self._datang = datang


    def setWaktuPulang(self,pulang):

        self._pulang = pulang


    def inputKendaraan(self):

        print("\n--- INPUT KENDARAAN---")

        self._no = input("No Kendaraan : ")


        print("\n--- Jam Masuk Kendaraan ---")

        self._datang.inputWaktu()


        print("\n--- Jam Keluar Kendaraan ---")

        self._pulang.inputWaktu()


    #Output

    def getNoKendaraan(self):

        return self._no


    def getJenis(self):

        return self._jenis
    def getWaktuDatang(self):
        return self._datang

    def getWaktuPulang(self):
        return self._pulang
    def getLamaParkir(self):
        return self._datang.cariDurasi(self._pulang)

    def getLamaJam(self):
        hasil = int(0)
        if(self.getLamaParkir().getMenit()>=10 or
self.getLamaParkir().getJam()>=1):
            hasil = self.getLamaParkir().getJam()

            if(self.getLamaParkir().getMenit()>0 or
self.getLamaParkir().getDetik()>0):
                hasil = hasil + 1

        return hasil

    def getKendaraan(self):
        print("Plat Nomor kendaraan = ",self._no)
        print("Jenis Kendaraan = " , self._jenis)
        print("Waktu masuk = ",self._datang.getWaktu())
        print("Waktu keluar = ",self._pulang.getWaktu())
        print("Lama Parkrir =
",self.getLamaParkir().getWaktu())
```

```
        print("Lama Jam = ",self.getLamaJam())
        print("Biaya = ",self.getBiayaParkir())

    def getBiayaParkir(self):
        ...
```

iii. Class Mobil

```
from Kendaraan import Kendaraan
class Mobil(Kendaraan):
    def __init__(self):
        super().__init__()
        self._jenis = "Mobil"

    def getBiayaParkir(self):
        return self.getLamaJam() * 3000
```

iv. Class Motor

```
from Kendaraan import Kendaraan
class Motor(Kendaraan):
    def __init__(self):
        super().__init__()
        self._jenis = "Motor"

    def getBiayaParkir(self):
        return self.getLamaJam() * 2000
```

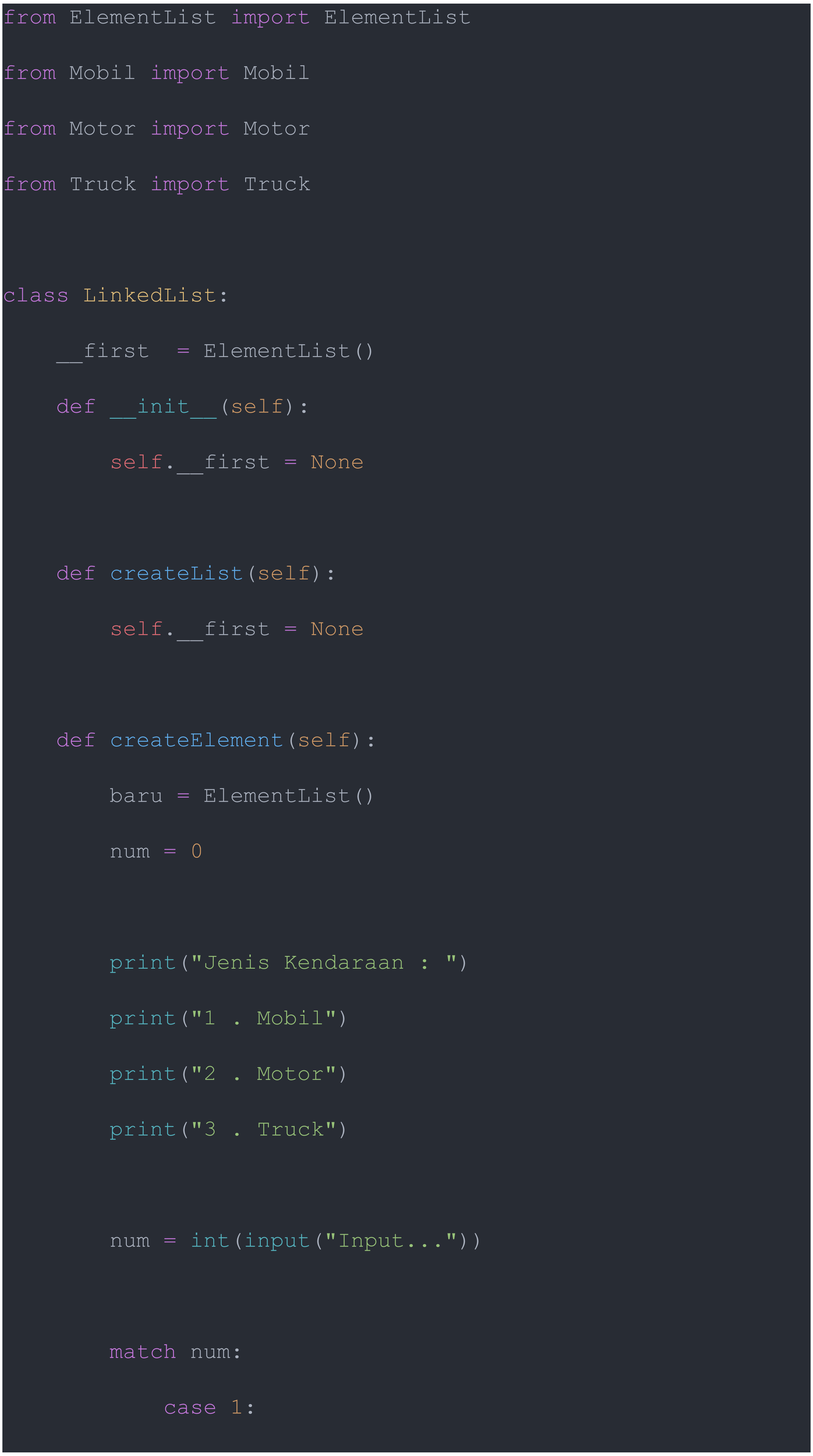
v. Class Truck

```
from Kendaraan import Kendaraan
class Truck(Kendaraan):
    def __init__(self):
        super().__init__()
        self._jenis = "Truck"

    def getBiayaParkir(self):
        return self.getLamaJam() * 10000
```

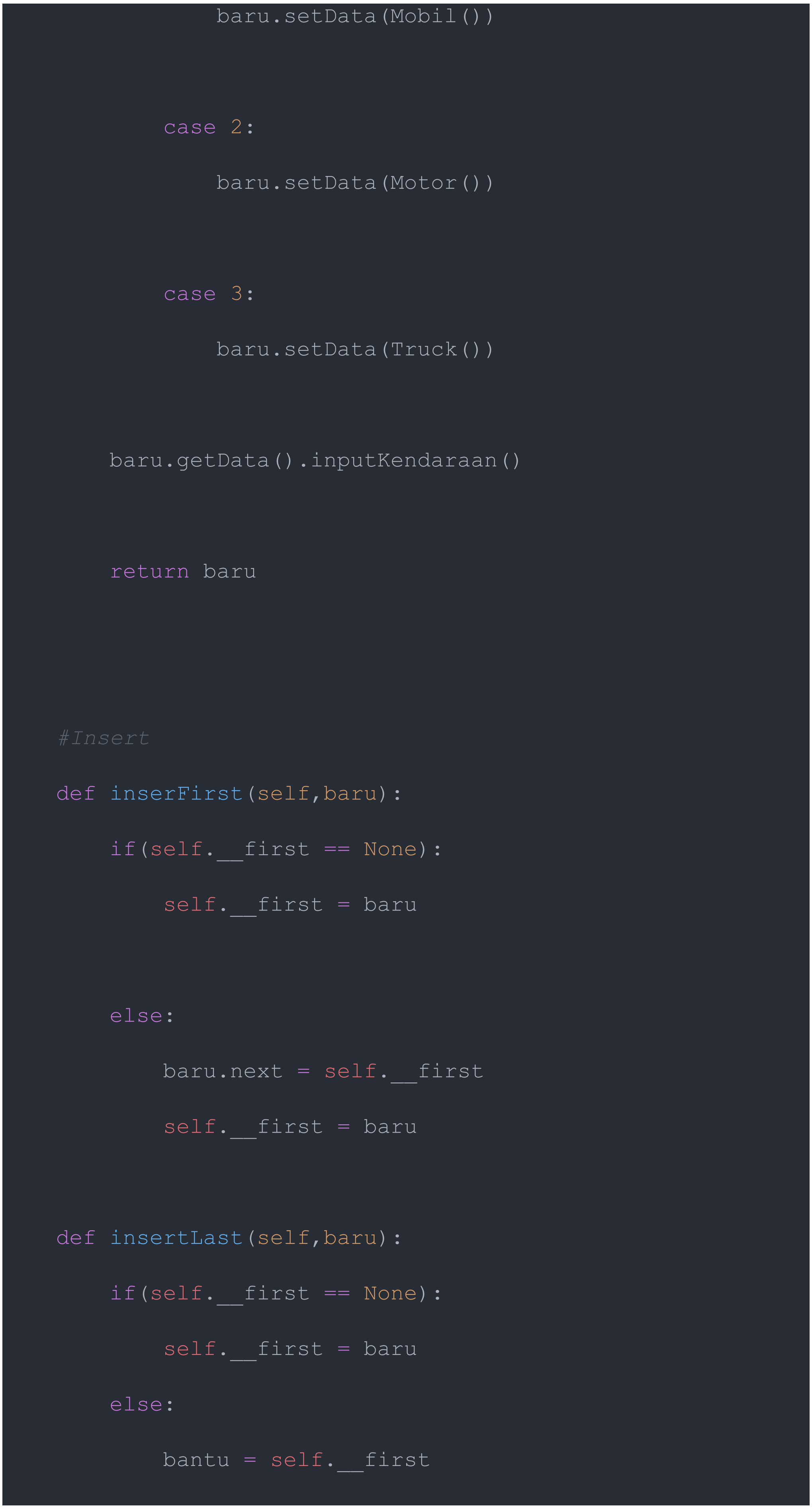
vi. Class Element List

```
class ElementList:
    #Constructor
    def __init__(self):
        self.next = None
        self.__info = None

    def setData(self,info):
        self.__info = info

    def getData(self):
        return self.__info
```

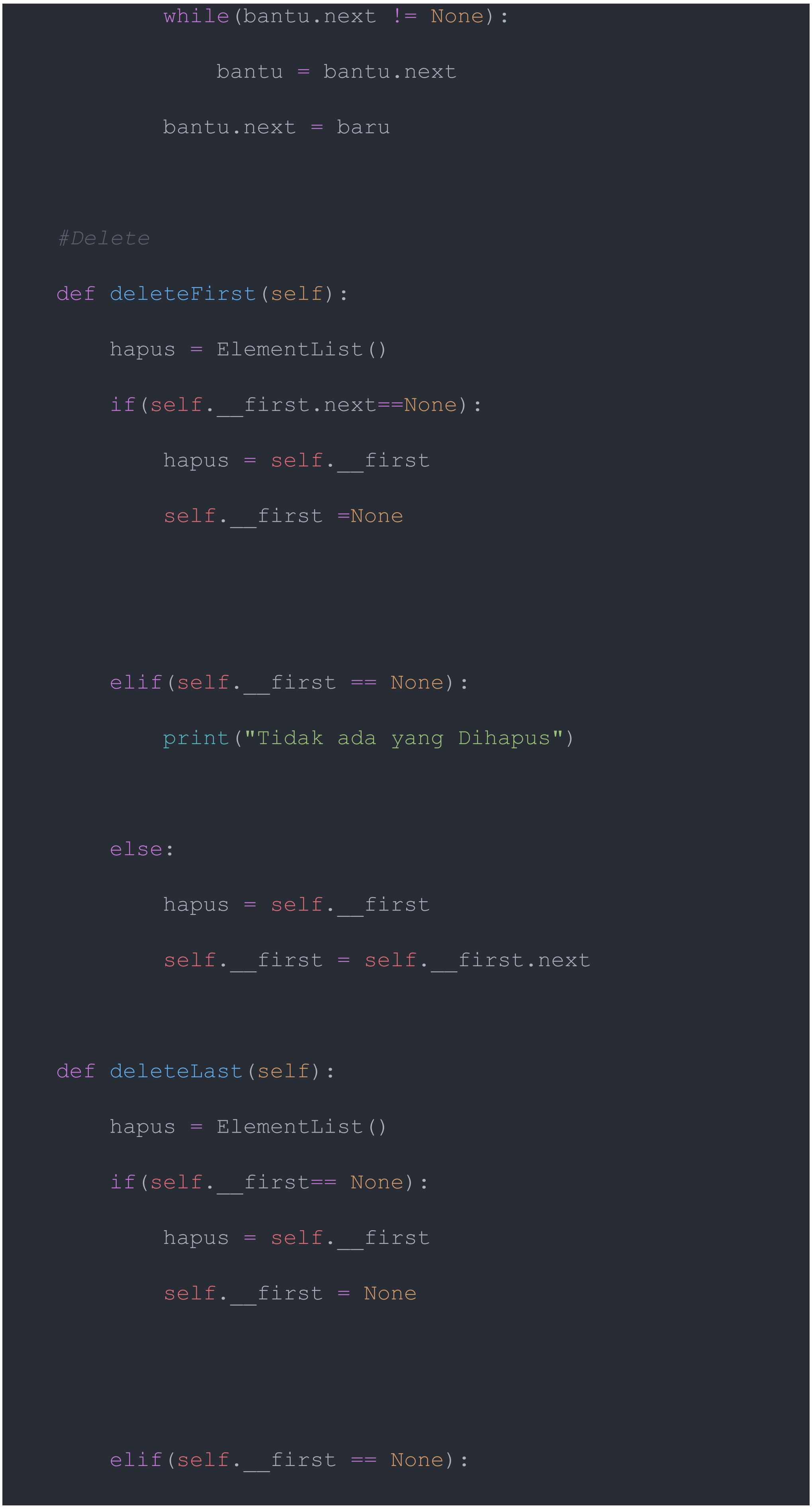
vii. Class Linked List



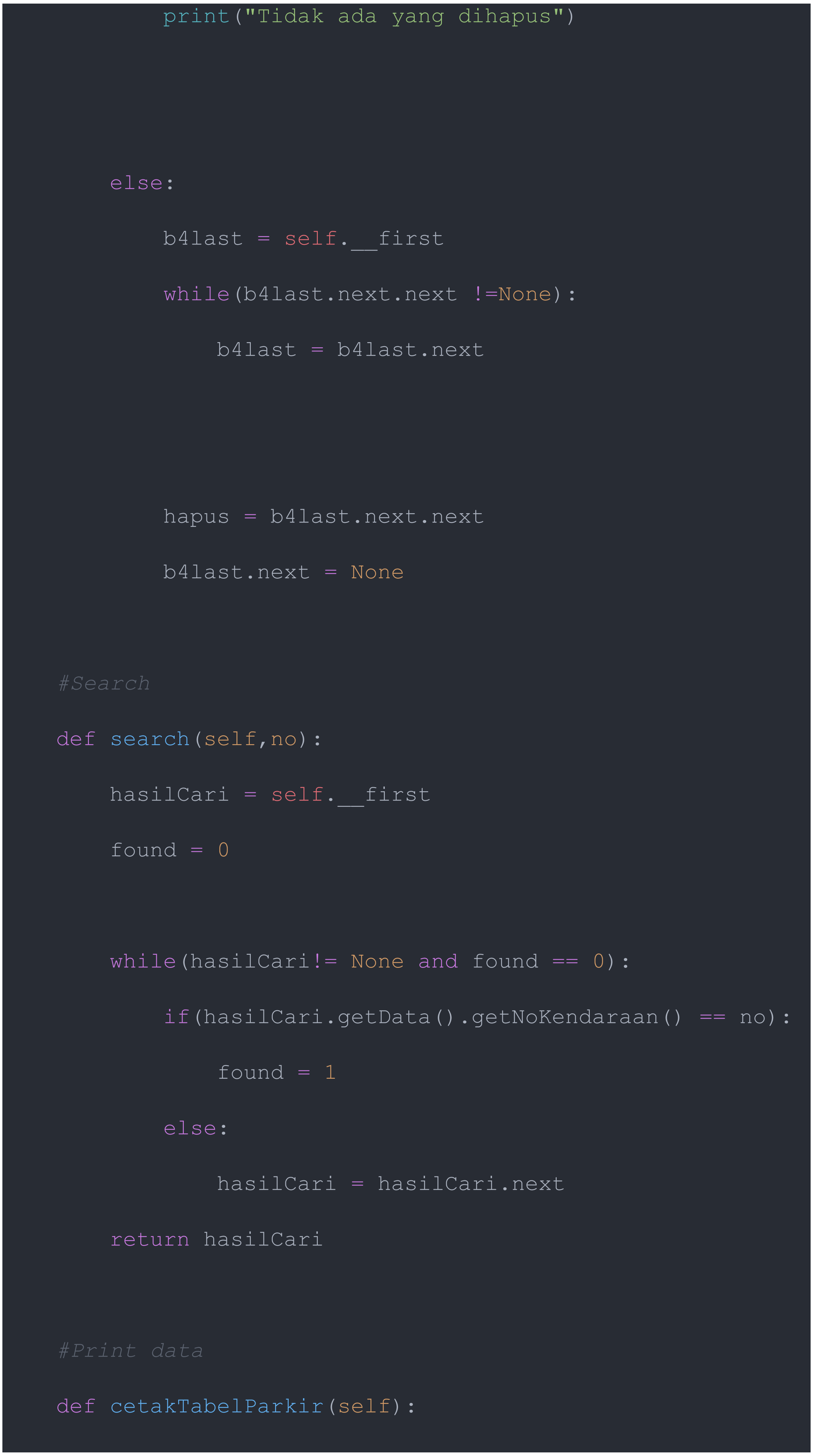
```
from ElementList import ElementList
from Mobil import Mobil
from Motor import Motor
from Truck import Truck

class LinkedList:
    __first  = ElementList()
    def __init__(self):
        self.__first = None

    def createList(self):
        self.__first = None

    def createElement(self):
        baru = ElementList()
        num = 0

        print("Jenis Kendaraan : ")
        print("1 . Mobil")
        print("2 . Motor")
        print("3 . Truck")

        num = int(input("Input..."))

        match num:
            case 1:
```



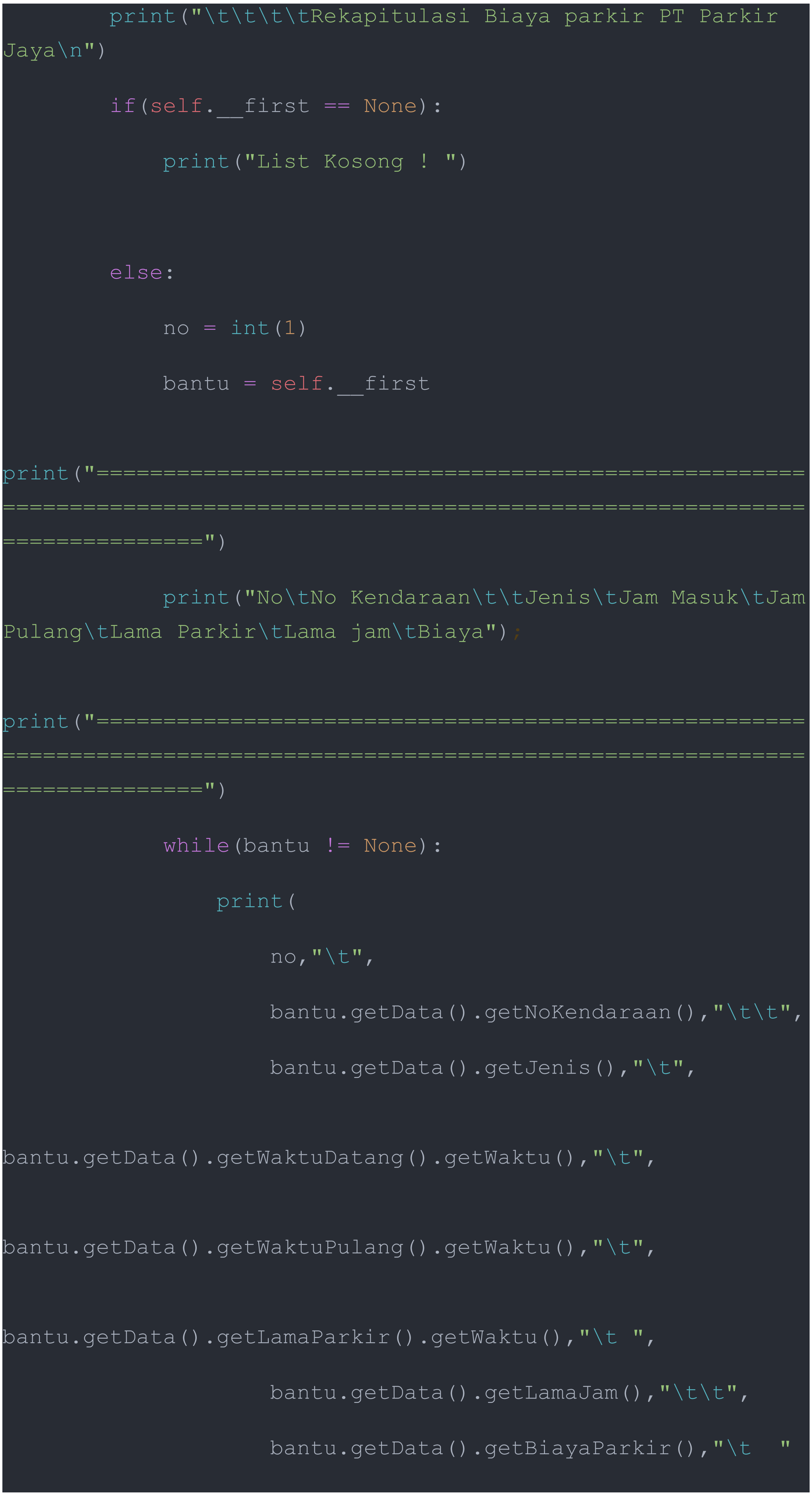
```
                baru.setData(Mobil())

            case 2:
                baru.setData(Motor())

            case 3:
                baru.setData(Truck())

        baru.getData().inputKendaraan()

        return baru


    #Insert
    def inserFirst(self,baru):
        if(self.__first == None):
            self.__first = baru

        else:
            baru.next = self.__first
            self.__first = baru

    def insertLast(self,baru):
        if(self.__first == None):
            self.__first = baru
        else:
            bantu = self.__first
```



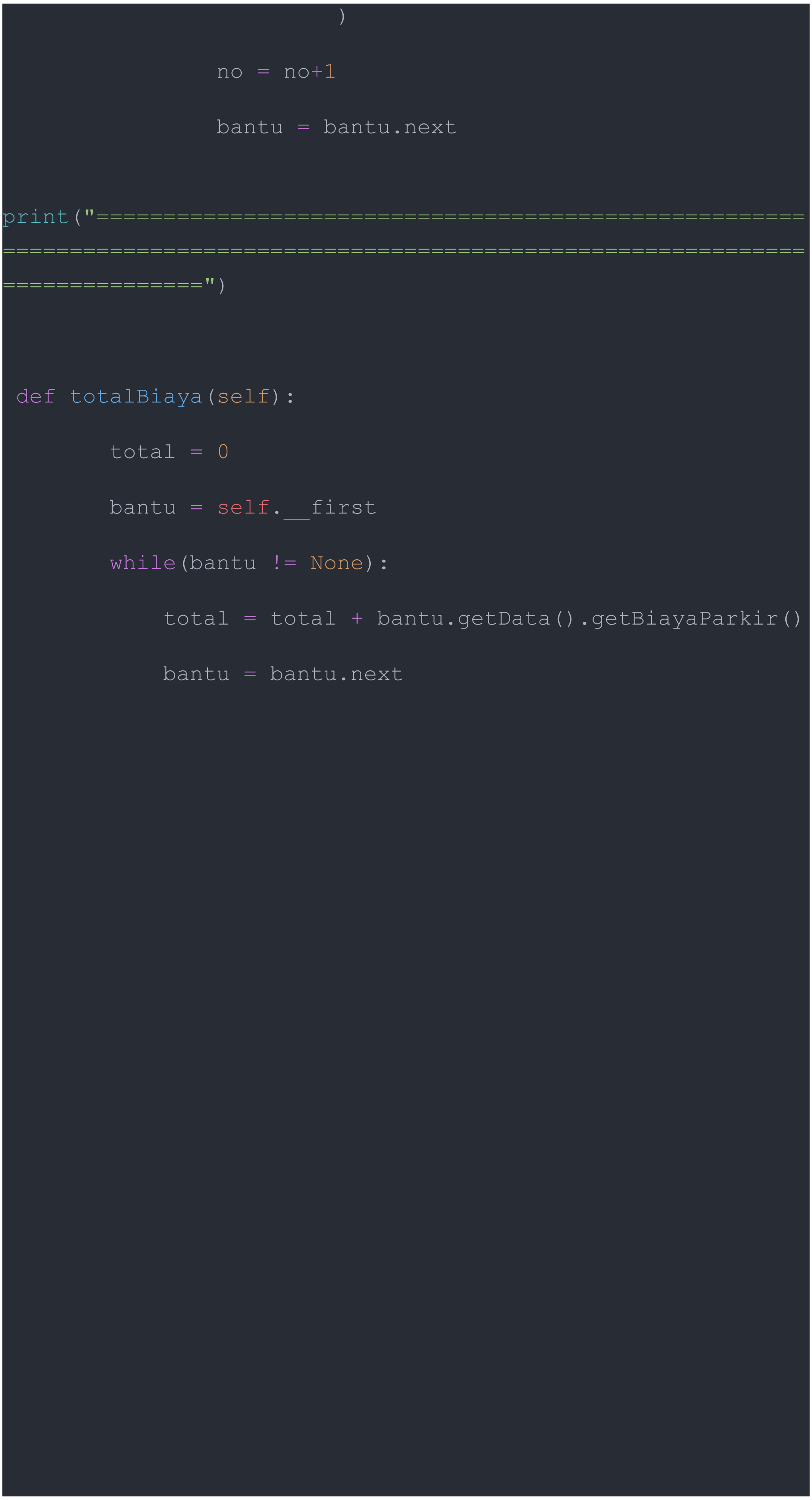
```
            while(bantu.next != None):
                bantu = bantu.next
            bantu.next = baru

    #Delete
    def deleteFirst(self):
        hapus = ElementList()
        if(self.__first.next==None):
            hapus = self.__first
            self.__first =None


        elif(self.__first == None):
            print("Tidak ada yang Dihapus")

        else:
            hapus = self.__first
            self.__first = self.__first.next

    def deleteLast(self):
        hapus = ElementList()
        if(self.__first== None):
            hapus = self.__first
            self.__first = None


        elif(self.__first == None):
```



```
            print("Tidak ada yang dihapus")


        else:
            b4last = self.__first
            while(b4last.next.next !=None):
                b4last = b4last.next


            hapus = b4last.next.next
            b4last.next = None

    #Search
    def search(self,no):
        hasilCari = self.__first
        found = 0

        while(hasilCari!= None and found == 0):
            if(hasilCari.getData().getNoKendaraan() == no):
                found = 1
            else:
                hasilCari = hasilCari.next
        return hasilCari

    #Print data
    def cetakTabelParkir(self):
```



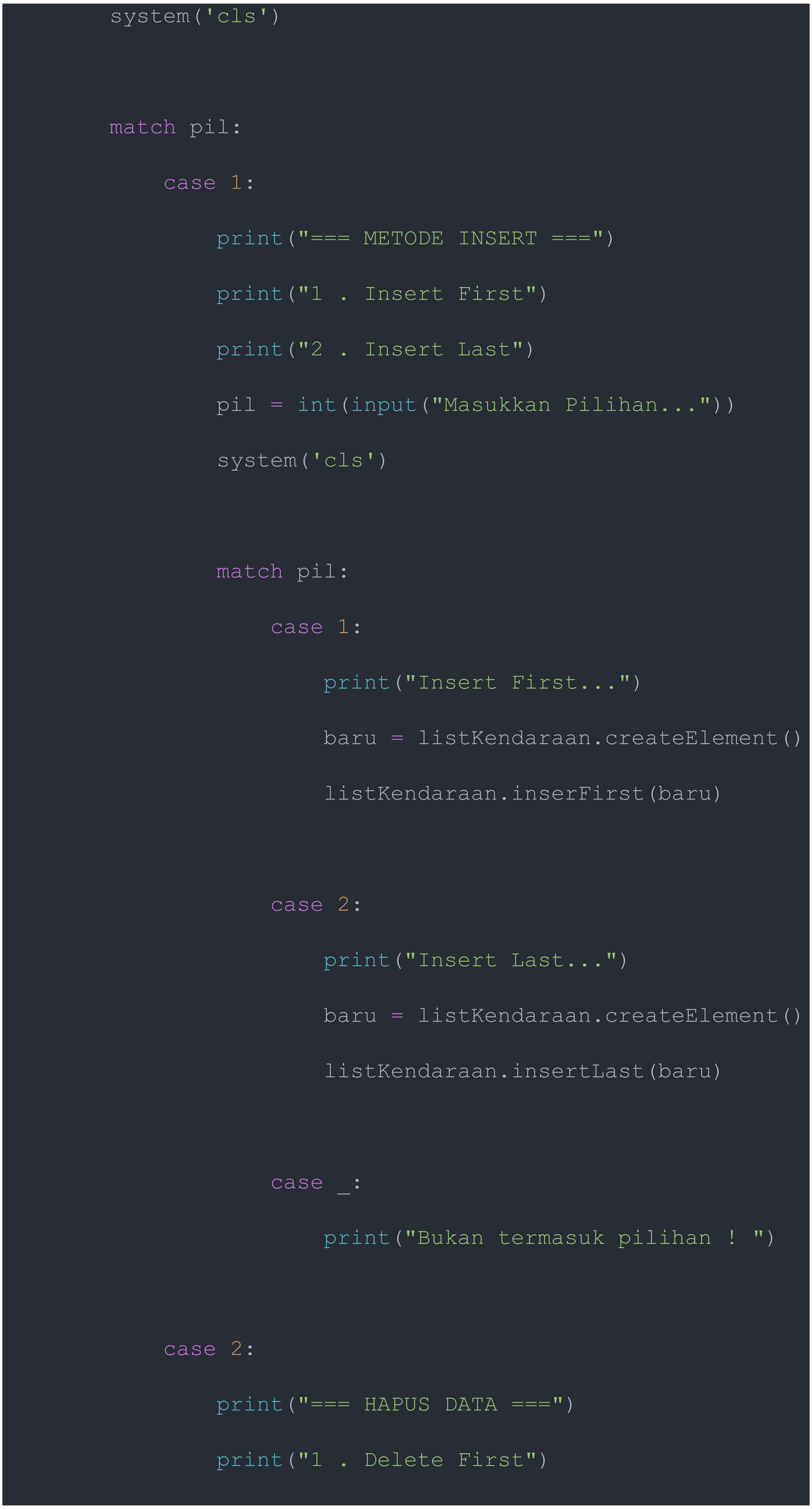
```
        print("\t\t\t\tRekapitulasi Biaya parkir PT Parkir
Jaya\n")
        if(self.__first == None):
            print("List Kosong ! ")

        else:
            no = int(1)
            bantu = self.__first

print("=====================================================
============================================================
===============")
            print("No\tNo Kendaraan\t\tJenis\tJam Masuk\tJam
Pulang\tLama Parkir\tLama jam\tBiaya");

print("=====================================================
============================================================
===============")
            while(bantu != None):
                print(
                    no,"\t",
                    bantu.getData().getNoKendaraan(),"\t\t",
                    bantu.getData().getJenis(),"\t",

bantu.getData().getWaktuDatang().getWaktu(),"\t",

bantu.getData().getWaktuPulang().getWaktu(),"\t",

bantu.getData().getLamaParkir().getWaktu(),"\t ",
                    bantu.getData().getLamaJam(),"\t\t",
                    bantu.getData().getBiayaParkir(),"\t  "
```



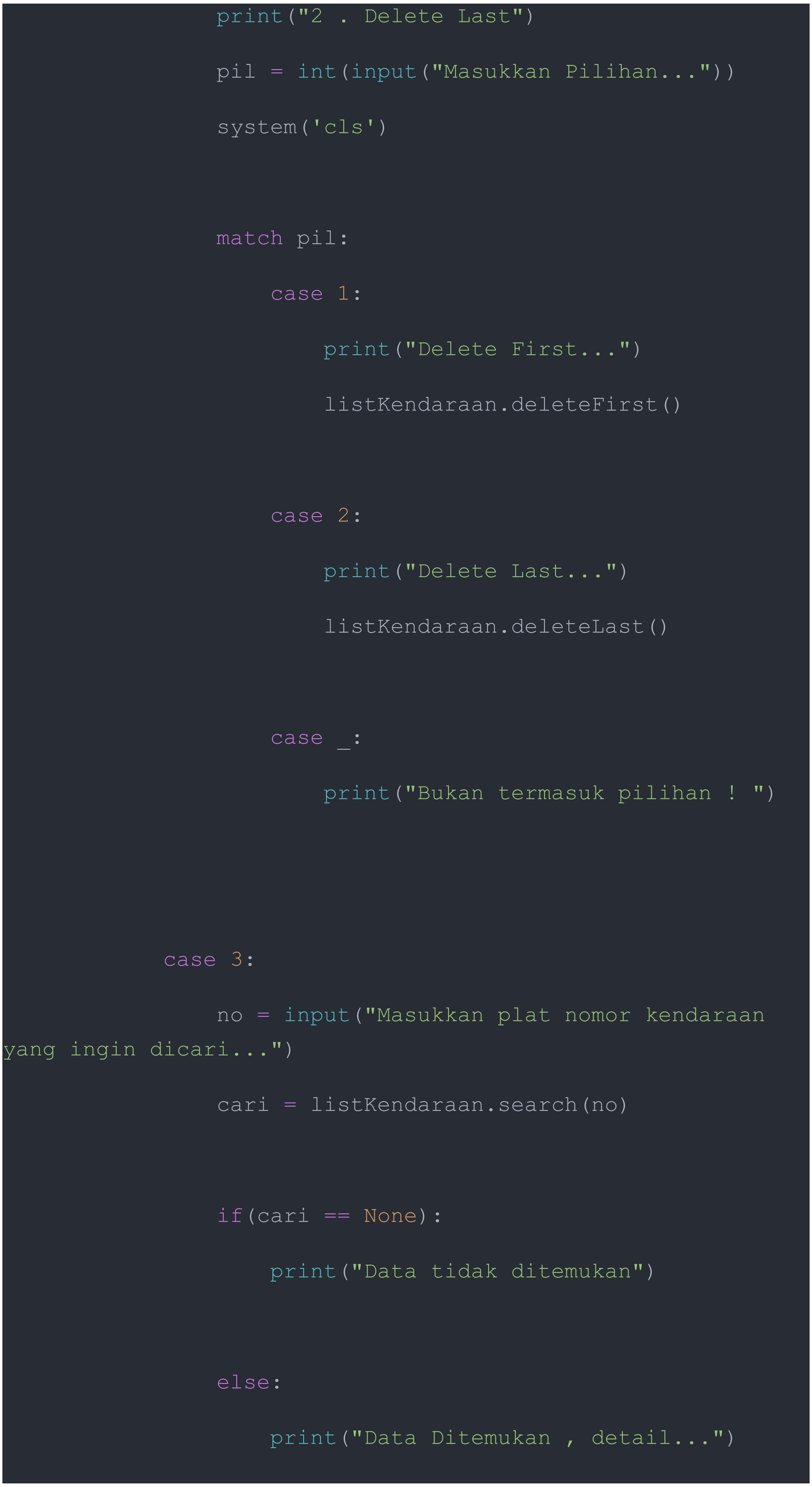
```
                         )
                no = no+1
                bantu = bantu.next

print("=====================================================
============================================================
===============")


 def totalBiaya(self):
        total = 0
        bantu = self.__first
        while(bantu != None):
            total = total + bantu.getData().getBiayaParkir()
            bantu = bantu.next
```

viii. Class Main

```
from LinkedList import LinkedList

from ElementList import ElementList

from os import system


def menu():

    print("===== MENU =====");

    print("1 . Tambah Data");

    print("2 . Hapus Data");

    print("3 . Cari Data");

    print("4 . Tampilkan Data");

    print("5 . Keluar");

    print("Masukkan Pilihan...." ,end="");


baru = ElementList()

listKendaraan = LinkedList()

cari = ElementList()

cont = "Y"

pil = 0

try:

    while(True):

        menu()

        pil = int(input())
```

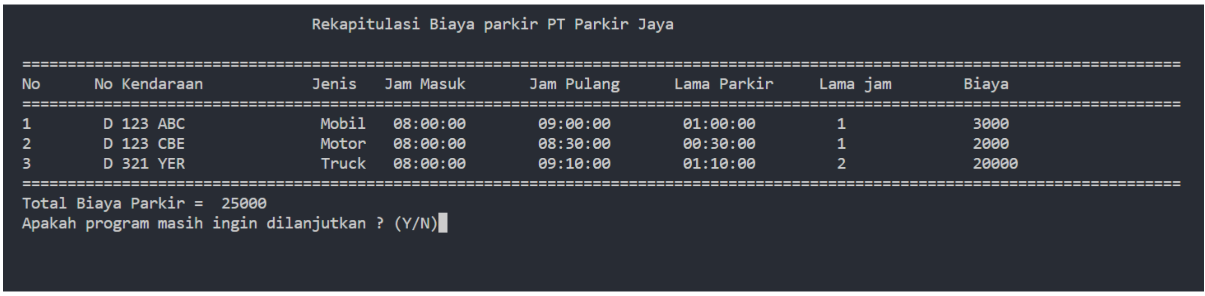


```
        system('cls')

        match pil:
            case 1:
                print("=== METODE INSERT ===")
                print("1 . Insert First")
                print("2 . Insert Last")
                pil = int(input("Masukkan Pilihan..."))
                system('cls')

                match pil:
                    case 1:
                        print("Insert First...")
                        baru = listKendaraan.createElement()
                        listKendaraan.inserFirst(baru)

                    case 2:
                        print("Insert Last...")
                        baru = listKendaraan.createElement()
                        listKendaraan.insertLast(baru)

                    case _:
                        print("Bukan termasuk pilihan ! ")

            case 2:
                print("=== HAPUS DATA ===")
                print("1 . Delete First")
```



```
                print("2 . Delete Last")
                pil = int(input("Masukkan Pilihan..."))
                system('cls')

                match pil:
                    case 1:
                        print("Delete First...")
                        listKendaraan.deleteFirst()

                    case 2:
                        print("Delete Last...")
                        listKendaraan.deleteLast()

                    case _:
                        print("Bukan termasuk pilihan ! ")


            case 3:
                no = input("Masukkan plat nomor kendaraan yang ingin dicari...")
                cari = listKendaraan.search(no)

                if(cari == None):
                    print("Data tidak ditemukan")

                else:
                    print("Data Ditemukan , detail...")
                    cari.getData().getKendaraan()


            case 4:
                listKendaraan.cetakTabelParkir()
                 print("Total Biaya Parkir = ",listKendaraan.totalBiaya())


            case 5:
                cont = "N"

            case _:
                print("Bukan termasuk pilihan ! ")

        cont = input("Apakah program masih ingin dilanjutkan ? (Y/N)")
        system('cls')
        if(cont!="Y"):
            break

    print("=== TERIMA KASIH ===")
except:
    print("Terdapat error...")
```

b. Screenshot



```
                                Rekapitulasi Biaya parkir PT Parkir Jaya

================================================================================================================================
No      No Kendaraan            Jenis   Jam Masuk       Jam Pulang      Lama Parkir     Lama jam        Biaya
================================================================================================================================
1        D 123 ABC               Mobil   08:00:00        09:00:00        01:00:00         1               3000
2        D 123 CBE               Motor   08:00:00        08:30:00        00:30:00         1               2000
3        D 321 YER               Truck   08:00:00        09:10:00        01:10:00         2               20000
================================================================================================================================
Total Biaya Parkir =  25000
Apakah program masih ingin dilanjutkan ? (Y/N)
```