**LAPORAN TUGAS AKHIR**

**POLA-POLA PERANCANGAN**

**COMBINING PATTERN :**

**FAÇADE & DECORATOR PATTERN**



**Kelas B**

**Disusun Oleh Kelompok 5**

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**PROGRAM STUDI INFORMATIKA**

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1. **STUDI KASUS**

Di sebuah PC Store menjual berbagai jenis PC, yaitu PC Game, PC Office, dan PC Workstation yang memiliki spesifikasi dan harga berbeda-beda, antara lain :

* 1. Casing
     + - Casing merk Dazumba Xfan, harga : Rp 41.000,-
       - Casing merk Coolingswift, harga : Rp 90.000,-
  2. Processor
     + - Intel Atom, harga : Rp 700.000,-
       - Intel Core i5, harga : Rp 1.000.000,-
       - AMDA6, harga : Rp 1.050.000,-
       - AMDA8, harga : Rp 1.550.000,-
  3. DVD
     + - DVD merk Samsung, harga : Rp 150.000,-
       - DVD merk Asus, harga : Rp 200.000,-
  4. Power Supply
     + - Power Supply merk Aerocool E78-430W, harga : Rp 292.000,-
       - Power Supply merk Bufftech 450W, harga : Rp 67.000,-
  5. HDD
     + - HDD kapasitas 500 GB merk Seagate, harga : Rp 650.000,-
       - HDD kapasitas 640 GB merk Toshiba, harga : Rp 800.000,-
       - HDD kapasitas 1 TB merk Toshiba, harga : Rp 845.000,-
  6. VGA
     + - VGA merk AMD ATI Radeon 2GB, harga : Rp 600.000,-
       - VGA merk NVIDIA GeForce 2GB, harga : Rp 700.000,-
  7. Motherboard
     + - Motherboard merk AS Rock, harga : Rp 550.000,-
       - Motherboard merk Asus P8H61M-E, harga : Rp 729.000,-
  8. RAM
     + - RAM kapasitas 2 GB merk VGEN, harga : Rp 200.000,-
       - RAM kapasitas 4 GB merk Sandisk, harga : Rp 470.500,-
       - RAM kapasitas 8 GB merk Sandisk, harga : Rp 770.500,-

Kemudian disediakan pula device tambahan dimana pembeli dapat membeli sesuai keinginannya, yaitu :

* + Monitor Acer 19 Inch, harga : Rp 850.000,-
  + Monitor Axioo 19 Inch, harga : Rp 600.000,-
  + Mouse Votre, harga : Rp 20.000,-
  + Mouse Cobra, harga : Rp 150.000,-
  + Keyboard Acer, harga : Rp 75.000,-
  + Keyboard A4TechX7 untuk Gaming, harga : Rp 200.000,-
  + Sound System merk Simbadda, harga : Rp 600.000,-
  + Sound System merk Logitech, harga : Rp 400.000,-

1. **COMBINING PATTERN**
   1. **Façade Pattern**

Ada beberapa alasan mengapa kami menggunakan Façade pattern dalam meng-*combine pattern* yaitu karena :

* Façade mendefinisikan interface baru dengan mudah.
* Façade juga menunjukkan bagaimana membuat objek tunggal yang merepresentasikan subsistem secara keseluruhan.
* Fokus dari Façade adalah untuk menciptakan interface yang lebih sederhana dan dapat menjadi *front-end* dari objek kompleks tunggal.
* Dengan menggunakan Façade, detil proses dan kompleksitas sistem disembunyikan dari pengguna.
* Pengguna hanya perlu mengakses Façade untuk dapat memanfaatkan salah satu fungsi dalam sistem.

Façade pattern menyediakan interface yang seragam untuk satu set interface dalam subsistem. Façade pattern mendefinisikan interface dengan tingkat yang lebih tinggi yang membuat subsistem lebih mudah digunakan. Design pattern Façade menyediakan interface yang mudah untuk digunakan dibandingkan dengan koleksi dari interface subsistem yang kompleks. Hal ini dapat membuatnya lebih mudah dengan menyembunyikan detail dari implementasi. Façade adalah interface dimana aplikasi dapat menggunakannya untuk melakukan sesuatu tanpa mengkhawatirkan mengenai detail-detail yang terlibat. Façade memisahkan layer-layer yang terlibat sehingga layer-layer tersebut tidak bergantung satu sama lainnya dimana membuat masing-masing layer dapat dengan mudah untuk dikembangkan, mudah untuk digunakan, dan mempertimbangkan untuk menggunakan code re-use.

Komponen Façade Pattern :

* Façade

Mengetahui kelas-kelas subsistem yang bertanggung jawab terhadap permintaan dan mendelegasikan permintaan dari klien kepada objek subsistem yang bersesuaian.

* Subsystem

Mengimplementasikan fungsionalitas dari subsistem, menangani pekerjaan yang diberikan oleh objek Façade, serta tidak mempunyai pengetahuan mengenai Façade dan tidak peduli dengan reference mengenai hal ini.

* 1. **Decorator Pattern**

Ada beberapa alasan mengapa kami menggunakan Façade pattern dalam meng-*combine pattern* yaitu karena :

* Decorator Pattern fleksibel dalam menambahan responsibilitas pada objek dibandingkan dengan memiliki banyak inheritance di dalam objek ConcreteComponent. Dengan decorator, responsibilitas dapat ditambahkan maupun dikurangi dengan cara yang sederhana (dengan attach dan detach). Jika dengan cara biasa, kita harus membuat multiple inheritance pada objek secara manual.
* Decorator Pattern menawarkan cara yang adil dalam memberikan responsibilitas. Pada kasus yang lebih kompleks, kita dapat dengan mudah menambahkan responsibilitas tanpa harus meng-inheritance objek fitur sebelum ditambahkan. Konsep Decorator Pattern dapat dianalogikan kita membeli apa yang kita gunakan. Dengan konsep ini, objek ConcreteDecorator dapat berdiri tanpa harus dependent ke objek ConcreteComponent.
* Objek Decorator bertindak layaknya objek transparan, di mana saat ditambahkan, ConcreteComponent tidak perlu menginisiasi objek ConcreteDecorator secara jelas. Ini akan meningkatkan fleksibilitas dalam penulisan inheritance objek.
* Dengan konsep Decorator Pattern, memungkinkan akan menghasilkan banyak objek spesifik. Masing-masing fitur direpresentasikan pada objek ConcreteDecorator yang berbeda-beda. Ini memberikan keleluasaan untuk memodifikasi fitur yang ada di dalamnya. Untuk itu, dibutuhkan dokumentasi teknis agar kita dapat memahami peran masing-masing objek.

Decorator pattern merupakan pattern yang memberikan cara dinamis untuk menambahkan dan meng-override perilaku dari method yang ada dalam sebuah object. Tujuan dari decorator pattern adalah menciptakan suatu mata rantai objek,  dimana setiap objek mempunyai object responsible  pada fungsi objek berikutnya.

Komponen Decorator Pattern :

* Component

Merupakan interface dari objek-objek yang memiliki tanggung jawab untuk ditambahkan ke ConcreteComponent.

* Concrete Component

Mendefinisikan sebuah objek yang memiliki kemampuan untuk menempelkan fitur tambahan dari objek lain ke dalam dirinya.

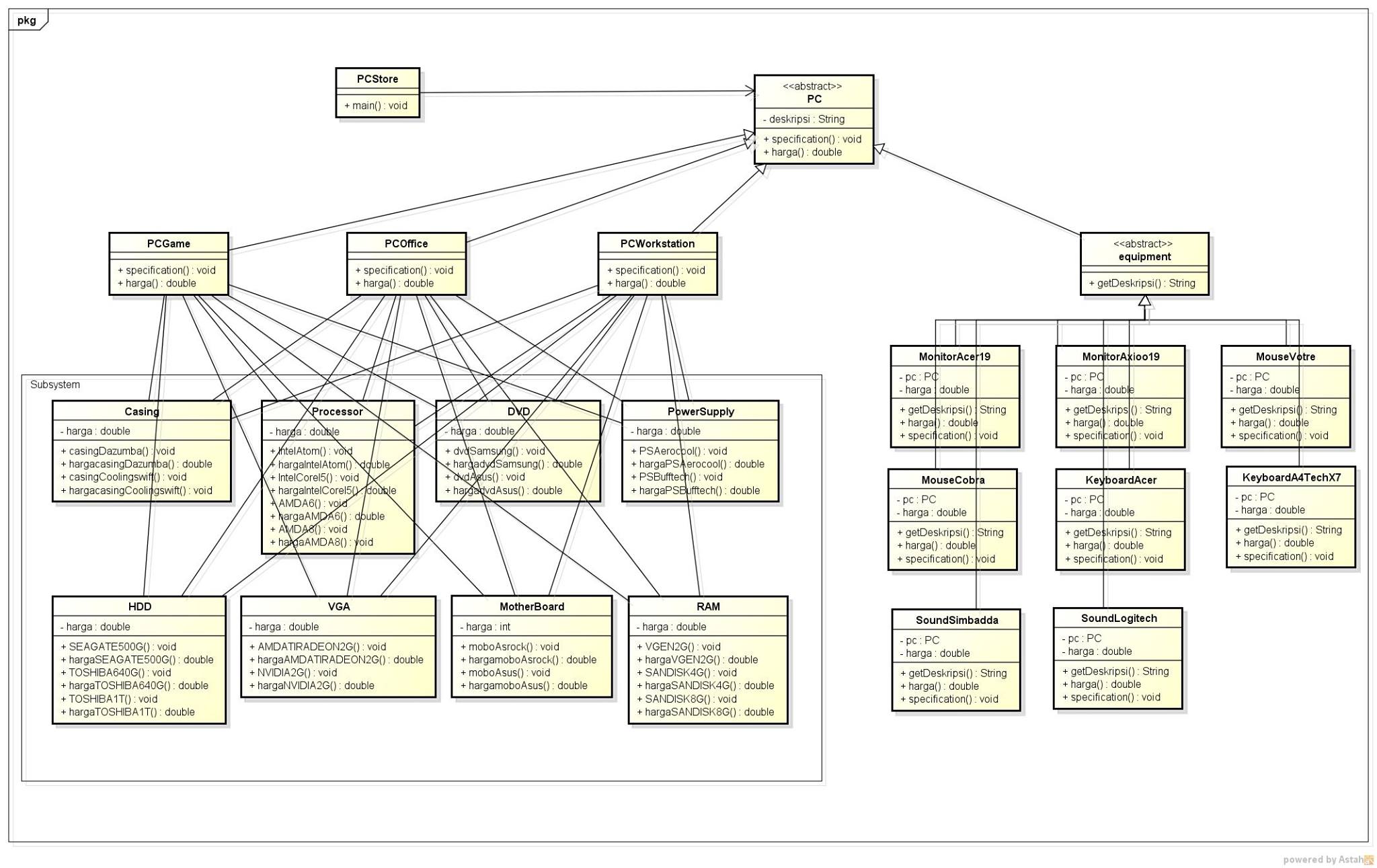
* Decorator

Sebuah objek reference abstrak dari objek-objek yang merepresentasikan sebagai fitur-fitur tambahan yang nantinya akan ditempelkan pada ConcreteComponent.

* Concrete Decorator

Bagian yang merepresentasikan objek tambahan yang dapat ditempelkan pada ConcreteComponent.

1. **CLASS DIAGRAM**

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Komponen-komponen dalam class diagram

* Component : class PC
* Concrete Component & Façade : class PCGame, PCOffice, PCWorkstation
* Subsystem : class Casing, Processor, DVD, PowerSupply, HDD, VGA, MotherBoard, RAM
* Decorator : class equipment
* Concrete Decorator : class MonitorAcer19, MonitorAxioo19, MouseVotre, MouseCobra, KeyboardAcer, KeyboardA4TechX7, SoundSimbadda, SoundLogitech

1. **SOURCE CODE**

Component : class PC

|  |
| --- |
| package pcstore;  /\*\*  \*  \* @author Hermawan Kusuma  \*/  public abstract class PC {  String deskripsi = "Unknown PC Specifications";    public String getDeskripsi() {  return deskripsi;  }    public abstract void specification();  public abstract double harga();  } |

Concrete Component & Façade :

* + - * + Class PCGame

|  |
| --- |
| package pcstore;  /\*\*  \*  \* @author Hermawan Kusuma  \*/  public class PCGame extends PC{  RAM ram;  Processor proc;  HDD hdd;  VGA vga;  PowerSupply ps;  MotherBoard mobo;  Casing casing;  DVD dvd;    public PCGame(RAM ram,  Processor proc,  HDD hdd,  VGA vga,  PowerSupply ps,  MotherBoard mobo,  Casing casing,  DVD dvd) {  this.ram=ram;  this.proc=proc;  this.hdd=hdd;  this.vga=vga;  this.ps=ps;  this.mobo=mobo;  this.casing=casing;  this.dvd=dvd;  deskripsi = "\n in PC Game";  }    public void specification(){  System.out.println("--------------------------------------------------");  System.out.println("|-------Detail Spesifikasi PC Game----------------|");  System.out.println("--------------------------------------------------");  ram.SANDISK8G();  proc.AMDA6();  hdd.TOSHIBA1T();  vga.NVIDIA2G();  ps.PSBufftech();  mobo.hargamoboAsrocks();  casing.casingCoolingswift();  dvd.dvdAsus();  }  public double harga() {  double hargaram = ram.hargaSANDISK8G();  double hargaproc =proc.hargaAMDA6();  double hargahdd =hdd.hargaTOSHIBA1T();  double hargavga =vga.hargaNVIDIA2G();  double hargaps = ps.hargaPSBufftech();  double hargamobo =mobo.hargamoboAsrocks();  double hargacasing =casing.hargacasingCoolingswift();  double hargadvd =dvd.hargadvdAsus();  double hargaCPU = hargaram+hargaproc+hargahdd+hargavga+hargaps+hargamobo+hargacasing+hargadvd;  System.out.println("---------------------------------------------------");  System.out.println("---------------------------------------------------");  System.out.println("Harga PC Game = Rp "+hargaCPU+",-");  return hargaCPU;  }    } |

* + - * + Class PCOffice

|  |
| --- |
| package pcstore;  /\*\*  \*  \* @author Hermawan Kusuma  \*/  public class PCOffice extends PC{  RAM ram;  Processor proc;  HDD hdd;  VGA vga;  PowerSupply ps;  MotherBoard mobo;  Casing casing;  DVD dvd;    public PCOffice(RAM ram,  Processor proc,  HDD hdd,  VGA vga,  PowerSupply ps,  MotherBoard mobo,  Casing casing,  DVD dvd) {  this.ram=ram;  this.proc=proc;  this.hdd=hdd;  this.vga=vga;  this.ps=ps;  this.mobo=mobo;  this.casing=casing;  this.dvd=dvd;  deskripsi = "\n in PC Office";  }    public void specification(){  System.out.println("--------------------------------------------------");  System.out.println("|-------Detail Spesifikasi PC Office----------------|");  System.out.println("--------------------------------------------------");  ram.VGEN2G();  proc.IntelAtom();  hdd.SEAGATE500G();  ps.PSBufftech();  mobo.hargamoboAsus();  casing.casingDazumba();  dvd.dvdSamsung();  }  public double harga() {  double hargaram = ram.hargaVGEN2G();  double hargaproc =proc.hargaIntelAtom();  double hargahdd =hdd.hargaSEAGATE500G();  double hargaps = ps.hargaPSBufftech();  double hargamobo =mobo.hargamoboAsus();  double hargacasing =casing.hargacasingDazumba();  double hargadvd =dvd.hargadvdSamsung();  double hargaCPU = hargaram+hargaproc+hargahdd+hargaps+hargamobo+hargacasing+hargadvd;  System.out.println("---------------------------------------------------");  System.out.println("---------------------------------------------------");  System.out.println("Harga PC Office = Rp "+hargaCPU+",-");  return hargaCPU;  }    } |

* + - * + Class PCWorkstation

|  |
| --- |
| package pcstore;  /\*\*  \*  \* @author Hermawan Kusuma  \*/  public class PCWorkstation extends PC{  RAM ram;  Processor proc;  HDD hdd;  VGA vga;  PowerSupply ps;  MotherBoard mobo;  Casing casing;  DVD dvd;    public PCWorkstation(RAM ram,  Processor proc,  HDD hdd,  VGA vga,  PowerSupply ps,  MotherBoard mobo,  Casing casing,  DVD dvd) {  this.ram=ram;  this.proc=proc;  this.hdd=hdd;  this.vga=vga;  this.ps=ps;  this.mobo=mobo;  this.casing=casing;  this.dvd=dvd;  deskripsi = "\n in PC Workstation";  }    public void specification(){  System.out.println("--------------------------------------------------");  System.out.println("|-------Detail Spesifikasi PC Workstation----------------|");  System.out.println("--------------------------------------------------");  ram.SANDISK8G();  proc.AMDA8();  hdd.TOSHIBA1T();  vga.AMDATIRADEON2G();  ps.PSAerocool();  mobo.hargamoboAsrocks();  casing.casingCoolingswift();  dvd.dvdAsus();  }  public double harga() {  double hargaram = ram.hargaSANDISK8G();  double hargaproc =proc.hargaAMDA8();  double hargahdd =hdd.hargaTOSHIBA1T();  double hargavga =vga.hargaAMDATIRADEON2G();  double hargaps = ps.hargaPSAerocool();  double hargamobo =mobo.hargamoboAsrocks();  double hargacasing =casing.hargacasingCoolingswift();  double hargadvd =dvd.hargadvdAsus();  double hargaCPU = hargaram+hargaproc+hargahdd+hargavga+hargaps+hargamobo+hargacasing+hargadvd;  System.out.println("---------------------------------------------------");  System.out.println("---------------------------------------------------");  System.out.println("Harga PC Workstation = Rp "+hargaCPU+",-");  return hargaCPU;  }    } |

Subsystem:

* + - * + Class Casing

|  |
| --- |
| package pcstore;  /\*\*  \*  \* @author Hermawan Kusuma  \*/  public class Casing {  double harga;      public void casingDazumba(){  System.out.println("Casing merk Dazumba Xfan");  System.out.println("Harga : Rp 41000");  System.out.println("----------------------------------------------");  }      public double hargacasingDazumba(){  double harga = 41000;  this.harga=harga;  return harga;  }  //------------------------------Produk Lain------------------------------------------      public void casingCoolingswift(){  System.out.println("Casing merk Coolingswift");  System.out.println("Harga : Rp 90000");  System.out.println("----------------------------------------------");  }    public double hargacasingCoolingswift(){  double harga = 90000;  this.harga=harga;  return harga;  }  //------------------------------Produk Lain------------------------------------------    } |

* + - * + Class Processor

|  |
| --- |
| package pcstore;  /\*\*  \*  \* @author Hermawan Kusuma  \*/  public class Processor {  double harga;    public void IntelAtom(){  System.out.println("Processor Intel Atom dengan Kecepatan...");  System.out.println("Harga : Rp 700000");  System.out.println("----------------------------------------------");  }    public double hargaIntelAtom(){  double harga = 700000;  this.harga=harga;  return harga;  }  //------------------------------Produk Lain------------------------------------------    public void IntelCoreI5(){  System.out.println("Processor Intel Atom dengan Kecepatan...");  System.out.println("Harga : Rp 1000000");  System.out.println("----------------------------------------------");  }    public double hargaIntelCoreI5(){  double harga = 1000000;  this.harga=harga;  return harga;  }  //------------------------------Produk Lain------------------------------------------    public void AMDA6(){  System.out.println("Processor AMD A6 dengan Kecepatan...");  System.out.println("Harga : Rp 1050000");  System.out.println("----------------------------------------------");  }  public double hargaAMDA6(){  double harga = 1050000;  this.harga=harga;  return harga;  }  //------------------------------Produk Lain------------------------------------------    public void AMDA8(){  System.out.println("Processor AMD A8 dengan Kecepatan...");  System.out.println("Harga : Rp 1550000");  System.out.println("----------------------------------------------");  }  public double hargaAMDA8(){  double harga = 1550000;  this.harga=harga;  return harga;  }  } |

* + - * + Class DVD

|  |
| --- |
| package pcstore;  /\*\*  \*  \* @author Hermawan Kusuma  \*/  public class DVD {  double harga;      public void dvdSamsung(){  System.out.println("DVD merk Samsung");  System.out.println("Harga : Rp 150000");  System.out.println("----------------------------------------------");  }      public double hargadvdSamsung(){  double harga = 150000;  this.harga=harga;  return harga;  }  //------------------------------Produk Lain------------------------------------------      public void dvdAsus(){  System.out.println("DVD merk Asus");  System.out.println("Harga : Rp 200000");  System.out.println("----------------------------------------------");  }      public double hargadvdAsus(){  double harga = 200000;  this.harga=harga;  return harga;  }  //------------------------------Produk Lain------------------------------------------    } |

* + - * + Class Power Supply

|  |
| --- |
| package pcstore;  /\*\*  \*  \* @author Hermawan Kusuma  \*/  public class PowerSupply {  double harga;      public void PSAerocool(){  System.out.println("Power Supply merk Aerocool E78-430W");  System.out.println("Harga : Rp 292000");  System.out.println("----------------------------------------------");  }      public double hargaPSAerocool(){  double harga = 292000;  this.harga=harga;  return harga;  }  //------------------------------Produk Lain------------------------------------------      public void PSBufftech(){  System.out.println("Power Supply merk Bufftech 450W");  System.out.println("Harga : Rp 67000");  System.out.println("----------------------------------------------");  }      public double hargaPSBufftech(){  double harga = 67000;  this.harga=harga;  return harga;  }  //------------------------------Produk Lain------------------------------------------    } |

* + - * + Class HDD

|  |
| --- |
| package pcstore;  /\*\*  \*  \* @author Hermawan Kusuma  \*/  public class HDD {  double harga;      public void SEAGATE500G(){  System.out.println("Harddisk Kapasitas 500GB merk SEAGATE");  System.out.println("Harga : Rp 650000");  System.out.println("----------------------------------------------");  }    public double hargaSEAGATE500G(){  double harga = 650000;  this.harga=harga;  return harga;  }  //------------------------------Produk Lain------------------------------------------  public void TOSHIBA640G(){  System.out.println("Harddisk Kapasitas 640GB merk TOSHIBA");  System.out.println("Harga : Rp 800000");  System.out.println("----------------------------------------------");  }    public double hargaTOSHIBA640G(){  double harga = 800000;  this.harga=harga;  return harga;  }  //------------------------------Produk Lain------------------------------------------    public void TOSHIBA1T(){  System.out.println("Harddisk Kapasitas 1TB merk TOSHIBA");  System.out.println("Harga : Rp 845000");  System.out.println("----------------------------------------------");  }    public double hargaTOSHIBA1T(){  double harga = 845000;  this.harga=harga;  return harga;  }  //------------------------------Produk Lain------------------------------------------  } |

* + - * + Class VGA

|  |
| --- |
| package pcstore;  /\*\*  \*  \* @author Hermawan Kusuma  \*/  public class VGA {  double harga;      public void AMDATIRADEON2G(){  System.out.println("VGA merk AMD ATI RADEON 2GB");  System.out.println("Harga : Rp 600000");  System.out.println("----------------------------------------------");  }    public double hargaAMDATIRADEON2G(){  double harga = 600000;  this.harga=harga;  return harga;  }  //------------------------------Produk Lain------------------------------------------    public void NVIDIA2G(){  System.out.println("VGA merk NVIDIA GeForce 2GB");  System.out.println("Harga : Rp 700000");  System.out.println("----------------------------------------------");  }    public double hargaNVIDIA2G(){  double harga = 700000;  this.harga=harga;  return harga;  }  //------------------------------Produk Lain------------------------------------------    } |

* + - * + Class Motherboard

|  |
| --- |
| package pcstore;  /\*\*  \*  \* @author Hermawan Kusuma  \*/  public class MotherBoard {  double harga;      public void moboAsrock(){  System.out.println("Mother Board merk AS Rock");  System.out.println("Harga : Rp 550000");  System.out.println("----------------------------------------------");  }      public double hargamoboAsrocks(){  double harga = 550000;  this.harga=harga;  return harga;  }  //------------------------------Produk Lain------------------------------------------      public void moboAsus(){  System.out.println("Mother Board merk ASUS P8H61M-E");  System.out.println("Harga : Rp 729000");  System.out.println("----------------------------------------------");  }      public double hargamoboAsus(){  double harga = 729000;  this.harga=harga;  return harga;  }  //------------------------------Produk Lain------------------------------------------    } |

* + - * + Class RAM

|  |
| --- |
| package pcstore;  /\*\*  \*  \* @author Hermawan Kusuma  \*/  public class RAM {  double harga;      public void VGEN2G(){  System.out.println("RAM Kapasitas 2GB merk VGEN");  System.out.println("Harga : Rp 200000");  System.out.println("----------------------------------------------");  }    public double hargaVGEN2G(){  double harga = 200000;  this.harga=harga;  return harga;  }  //------------------------------Produk Lain------------------------------------------  public void SANDISK4G(){  System.out.println("RAM Kapasitas 4GB merk SanDisk");  System.out.println("Harga : Rp 470500");  System.out.println("----------------------------------------------");  }    public double hargaSANDISK4G(){  double harga = 470500;  this.harga=harga;  return harga;  }  //------------------------------Produk Lain------------------------------------------  public void SANDISK8G(){  System.out.println("RAM Kapasitas 8GB merk SanDisk");  System.out.println("Harga : Rp 770500");  System.out.println("----------------------------------------------");  }    public double hargaSANDISK8G(){  double harga = 770500;  this.harga=harga;  return harga;  }  //------------------------------Produk Lain------------------------------------------  } |

Decorator : Class equipment

|  |
| --- |
| package pcstore;  /\*\*  \*  \* @author Hermawan Kusuma  \*/  public abstract class equipment extends PC{  public abstract String getDeskripsi();    } |

Concrete Decorator :

* + - * + Class MonitorAcer19

|  |
| --- |
| package pcstore;  /\*\*  \*  \* @author Hermawan Kusuma  \*/  public class MonitorAcer19 extends equipment{  PC pc;  double harga;    public MonitorAcer19(PC pc){  this.pc = pc;  }  public String getDeskripsi() {  return "\n + Monitor ACER 19 Inch Harga Rp 850000,-"+pc.getDeskripsi();  }  public double harga() {  double harga = 850000;  this.harga=harga;  return harga+pc.harga();  }  @Override  public void specification() {  System.out.println(getDeskripsi());  System.out.println(harga());  }    } |

* + - * + Class MonitorAxioo19

|  |
| --- |
| package pcstore;  /\*\*  \*  \* @author Hermawan Kusuma  \*/  public class MonitorAxioo19 extends equipment{  PC pc;  double harga;    public MonitorAxioo19(PC pc){  this.pc = pc;  }  public String getDeskripsi() {  return "\n + Monitor AXIOO 19 Inch Harga Rp 600000,-"+pc.getDeskripsi();  }  public double harga() {  double harga = 600000;  this.harga=harga;  return harga+pc.harga();  }  @Override  public void specification() {  System.out.println(getDeskripsi());  System.out.println(harga());  }    } |

* + - * + Class MouseVotre

|  |
| --- |
| package pcstore;  /\*\*  \*  \* @author Hermawan Kusuma  \*/  public class MouseVotre extends equipment{  PC pc;  double harga;    public MouseVotre(PC pc){  this.pc = pc;  }  public String getDeskripsi() {  return "\n + Mouse Votre Harga Rp 20000,-"+pc.getDeskripsi();  }  public double harga() {  double harga = 20000;  this.harga=harga;  return harga+pc.harga();  }    public void specification() {  System.out.println(getDeskripsi());  System.out.println(harga());  }    } |

* + - * + Class MouseCobra

|  |
| --- |
| package pcstore;  /\*\*  \*  \* @author Hermawan Kusuma  \*/  public class MouseCobra extends equipment{  PC pc;  double harga;    public MouseCobra(PC pc){  this.pc = pc;  }  public String getDeskripsi() {  return "\n + Mouse Votre Harga Rp 150000,-"+pc.getDeskripsi();  }  public double harga() {  double harga = 150000;  this.harga=harga;  return harga+pc.harga();  }    public void specification() {  System.out.println(getDeskripsi());  System.out.println(harga());  }    } |

* + - * + Class KeyboardAcer

|  |
| --- |
| package pcstore;  /\*\*  \*  \* @author Hermawan Kusuma  \*/  public class KeyboardAcer extends equipment{  PC pc;  double harga;    public KeyboardAcer(PC pc){  this.pc = pc;  }  public String getDeskripsi() {  return "\n + Keyboard Acer Harga Rp 75000,-"+pc.getDeskripsi();  }  public double harga() {  double harga = 75000;  this.harga=harga;  return harga+pc.harga();  }    public void specification() {  System.out.println(getDeskripsi());  System.out.println(harga());  }    } |

* + - * + Class KeyboardA4TechX7

|  |
| --- |
| package pcstore;  /\*\*  \*  \* @author Hermawan Kusuma  \*/  public class KeyboardA4TechX7 extends equipment{  PC pc;  double harga;    public KeyboardA4TechX7(PC pc){  this.pc = pc;  }  public String getDeskripsi() {  return "\n + Keyboard A4TechX7 Untuk Gaming Harga Rp 200000,-"+pc.getDeskripsi();  }  public double harga() {  double harga = 200000;  this.harga=harga;  return harga+pc.harga();  }    public void specification() {  System.out.println(getDeskripsi());  System.out.println(harga());  }    } |

* + - * + Class SoundSimbadda

|  |
| --- |
| package pcstore;  /\*\*  \*  \* @author Hermawan Kusuma  \*/  public class SoundSimbadda extends equipment{  PC pc;  double harga;    public SoundSimbadda(PC pc){  this.pc = pc;  }  public String getDeskripsi() {  return "\n + Sound System merk Simbadda Harga Rp 600000,-"+pc.getDeskripsi();  }  public double harga() {  double harga = 600000;  this.harga=harga;  return harga+pc.harga();  }    public void specification() {  System.out.println(getDeskripsi());  System.out.println(harga());  }    } |

* + - * + Class SoundLogitech

|  |
| --- |
| package pcstore;  /\*\*  \*  \* @author Hermawan Kusuma  \*/  public class SoundLogitech extends equipment{  PC pc;  double harga;    public SoundLogitech(PC pc){  this.pc = pc;  }  public String getDeskripsi() {  return "\n + Sound System merk Logitech Harga Rp 400000,-"+pc.getDeskripsi();  }  public double harga() {  double harga = 400000;  this.harga=harga;  return harga+pc.harga();  }    public void specification() {  System.out.println(getDeskripsi());  System.out.println(harga());  }    } |

Main Class : PCStore

|  |
| --- |
| package pcstore;  /\*\*  \*  \* @author Hermawan Kusuma  \*/  public class PCStore {  /\*\*  \* @param args the command line arguments  \*/  public static void main(String[] args) {  RAM ram=new RAM();  Processor proc = new Processor();  HDD hdd=new HDD();  VGA vga = new VGA();  PowerSupply ps = new PowerSupply();  MotherBoard mobo = new MotherBoard();  Casing casing = new Casing();  DVD dvd = new DVD();  //============================================================================  PC game = new PCGame(ram,proc,hdd,vga,ps,mobo,casing,dvd);  game.specification();  game = new MonitorAcer19(game);  game = new MouseCobra(game);  game = new KeyboardA4TechX7(game);  game = new SoundSimbadda (game);    System.out.println("----------------------------------------------");  System.out.println("Equipments :"+game.getDeskripsi());  System.out.println("Harga Total Keseluruhan + Equipment : Rp "+game.harga()+",-");  System.out.println("---------------------------------------------------\n\n");    //============================================================================    PC office = new PCOffice(ram,proc,hdd,vga,ps,mobo,casing,dvd);  office.specification();  office = new MonitorAcer19(office);  office = new MouseVotre(office);  office = new KeyboardAcer(office);  office = new SoundLogitech (office);    System.out.println("----------------------------------------------");  System.out.println("Equipments :"+office.getDeskripsi());  System.out.println("Harga Total Keseluruhan + Equipment : Rp "+office.harga()+",-");  System.out.println("---------------------------------------------------\n\n");    //============================================================================  PC workstation = new PCWorkstation(ram,proc,hdd,vga,ps,mobo,casing,dvd);  workstation.specification();  workstation = new MonitorAcer19(workstation);  workstation = new MouseCobra(workstation);  workstation = new KeyboardA4TechX7(workstation);  workstation = new SoundSimbadda (workstation);    System.out.println("----------------------------------------------");  System.out.println("Equipments :"+workstation.getDeskripsi());  System.out.println("Harga Total Keseluruhan + Equipment : Rp "+workstation.harga()+",-");  System.out.println("---------------------------------------------------\n\n");    //============================================================================  }    } |

1. **OUTPUT**

