

**LAPORAN PRAKTIKUM PEMROGRAMAN BERORIENTASI OBJEK (PBO)**

**PRAKTIKUM 13**



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**FAKULTAS SAINS DAN TEKNOLOGI**

**PROGRAM STUDI S1 TEKNIK INFORMATIKA**

**UNIVERSITAS MUHAMMADIYAH KALIMANTAN TIMUR**

Link Github: [https://github.com/Rainzy21/Praktikum\\_PBO/tree/main/P12](https://github.com/Rainzy21/Praktikum_PBO/tree/main/P12)

a. Screenshoot kode latihan

```

1  from dataclasses import dataclass
2
3  @dataclass
4  class Product:
5      id: str
6      name: str
7      price: float
8
9  @dataclass
10 class CartItem:
11     product: Product
12     quantity: int
13
14     @property
15     def subtotal(self) -> float:
16         """Menghitung subtotal untuk item ini."""
17         return self.product.price * self.quantity

```

```

1  import logging
2  from models import Product
3
4  LOGGER = logging.getLogger('REPOSITORY')
5
6  class ProductRepository:
7      """Mengambil data produk (simulasi database)."""
8
9      def __init__(self):
10         # Data hardcoded untuk simulasi
11         self._products = {
12             "P001": Product(id="P001", name="Laptop Gaming", price=15000000),
13             "P002": Product(id="P002", name="Mouse Wireless", price=2500000),
14             "P003": Product(id="P003", name="Keyboard Mech", price=8000000),
15         }
16         LOGGER.info("ProductRepository initialized with 3 products.")
17
18     def get_all(self) -> list[Product]:
19         """Mengambil semua produk yang tersedia."""
20         return list(self._products.values())
21
22     def get_by_id(self, product_id: str) -> Product | None:
23         """Mencari produk berdasarkan ID."""
24         return self._products.get(product_id)

```

```

1  from abc import ABC, abstractmethod
2  import logging
3  from models import Product, CartItem
4  from typing import List
5
6  LOGGER = logging.getLogger('SERVICES')
7
8  # --- INTERFACE PEMBAYARAN (Diperlukan untuk DIP/OCP) ---
9  class IPaymentProcessor(ABC):
10     @abstractmethod
11     def process(self, amount: float) -> bool:
12         pass
13
14  # --- IMPLEMENTASI 1: TUNAI ---
15  class CashPayment(IPaymentProcessor):
16     def process(self, amount: float) -> bool:
17         LOGGER.info(f"Menerima TUNAI sejumlah: Rp{amount:,.0f}")
18         return True
19
20  # --- IMPLEMENTASI 2: DEBIT CARD (JAWABAN LATIHAN MANDIRI) ---
21  class DebitCardPayment(IPaymentProcessor):
22     def process(self, amount: float) -> bool:
23         LOGGER.info("Mengubungkan ke bank...")
24         LOGGER.info(f"Memproses pembayaran DEBIT sejumlah: Rp{amount:,.0f}")
25         LOGGER.info("Status: APPROVED (Saldo Terpotong)")
26         return True
27
28  # --- SERVICE KERANJANG BELANJA ---
29  class ShoppingCart:
30     """Mengelola item, kuantitas, dan total harga pesanan (SRP)."""
31
32     def __init__(self):
33         self._items: dict[str, CartItem] = {}
34
35     def add_item(self, product: Product, quantity: int = 1):
36         if product.id in self._items:
37             self._items[product.id].quantity += quantity
38         else:
39             self._items[product.id] = CartItem(product=product, quantity=quantity)
40
41         LOGGER.info(f"Added {quantity}x {product.name} to cart.")
42
43     def get_items(self) -> List[CartItem]:
44         return list(self._items.values())
45
46     @property
47     def total_price(self) -> float:
48         return sum(item.subtotal for item in self._items.values())

```

```

1 import logging
2 from repositories import ProductRepository
3 # Import Decouple untuk get dari service
4 from service import PaymentProcessor, ShoppingCart, CashPayment, DebitCardPayment
5 from models import Product
6
7 LOGGER = logging.getLogger("MAIN_APP")
8
9 class PosApp:
10     """Kelas Orchestrator (Apikasi Utama). Hanya mengkoordinasi flow dan menerima UI."""
11
12     def __init__(self, repository: ProductRepository, payment_processor: PaymentProcessor):
13         # Inisialisasi variabel di sini
14         self.repository = repository
15         self.payment_processor = payment_processor
16         self.cart = ShoppingCart()
17         LOGGER.info("POS Application Initialized.")
18
19     def display_menu(self):
20         LOGGER.info("\n--- DAFTAR PRODUK ---")
21         for p in self.repository.get_all():
22             LOGGER.info(f"[{p.id}] {p.name} - Rp{p.price:,0f}")
23
24     def handle_add_item(self):
25         product_id = input("Masukkan ID Produk: ").strip().upper()
26         product = self.repository.get_by_id(product_id)
27
28         if not product:
29             LOGGER.warning("Produk tidak ditemukan.")
30             return
31
32         try:
33             qty_input = input("Jumlah (default 1): ")
34             quantity = int(qty_input) if qty_input else 1
35             if quantity <= 0: raise ValueError
36             self.cart.add_item(product, quantity)
37             except ValueError:
38                 LOGGER.error("Jumlah tidak valid.")
39
40     def handle_checkout(self):
41         total = self.cart.total_price
42         if total == 0:
43             LOGGER.warning("Keranjang kosong.")
44             return
45
46         LOGGER.info(f"\nTotal Belanja: Rp{total:,0f}")
47
48         # Panggilan processor apapun yang di-inject saat init
49         success = self.payment_processor.process(total)
50
51         if success:
52             LOGGER.info("TRANSAKSI BERHASIL.")
53             self.print_receipt()
54             self.cart = ShoppingCart() # Reset cart
55         else:
56             LOGGER.error("TRANSAKSI GAGAL.")
57
58     def print_receipt(self):
59         LOGGER.info("\n--- STRUK PEMBELIAN ---")
60         for item in self.cart.get_items():
61             LOGGER.info(f"{item.product.name} x{item.quantity} = Rp{item.subtotal:,0f}")
62         LOGGER.info("-----")
63         LOGGER.info(f"TOTAL AKHIR: Rp{self.cart.total_price:,0f}")
64         LOGGER.info("-----")
65
66 # TITIK MASUK UTAMA (Orchestration)
67 if __name__ == "__main__":
68     # Setup logging
69     logging.basicConfig(level=logging.INFO, format='%(name)s - %(levelname)s - %(message)s')
70
71     # 1. Inisialisasi Lapisan Data
72     repo = ProductRepository()
73
74     # 2. Inisialisasi Service (MUBAH LATIHAN MANEGER)
75     # Kita ganti cashPayment() dengan DebitCardPayment()
76     # payment_method = cashPayment()
77     payment_method = DebitCardPayment()
78
79     # 3. Inject Dependencies ke Aplikasi Utama
80     # Perhatikan: Kita tidak mengulang kode di dalam kelas PosApp sama sekali.
81     app = PosApp(repository=repo, payment_processor=payment_method)
82
83     # Loop CLI
84     while True:
85         print("\nMenu Kasir:")
86         print("1. Tampilkan Produk")
87         print("2. Tambah ke Keranjang")
88         print("3. Checkout")
89         print("4. Keluar")
90
91         choice = input("Pilih opsi (1-4): ")
92
93         if choice == "1":
94             app.display_menu()
95         elif choice == "2":
96             app.handle_add_item()
97         elif choice == "3":
98             app.handle_checkout()
99         elif choice == "4":
100             LOGGER.info("Aplikasi dihentikan.")
101             break
102         else:
103             LOGGER.warning("Pilihan tidak valid.")

```

## Output

```

C:\Users\Lenovo\Documents\GitHub\Praktikum_PB0>C:\Python313\python.exe c:\Users\Lenovo\Documents\GitHub\Praktikum_PB0\P13\main_app.py
REPOSITORY - INFO - ProductRepository initialized with 3 products.
MAIN_APP - INFO - POS Application Initialized.

```

Menu Kasir:

1. Tampilkan Produk
2. Tambah ke Keranjang
3. Checkout
4. Keluar

Pilih opsi (1-4): 1

MAIN\_APP - INFO -

--- DAFTAR PRODUK ---

MAIN\_APP - INFO - [P001] Laptop Gaming - Rp15,000,000

MAIN\_APP - INFO - [P002] Mouse Wireless - Rp250,000

MAIN\_APP - INFO - [P003] Keyboard Mech - Rp800,000

Menu Kasir:

1. Tampilkan Produk
2. Tambah ke Keranjang
3. Checkout
4. Keluar

Pilih opsi (1-4): 1

## Screenshoot kode latihan mandiri

```

1 import logging
2 from repositories import ProductRepository
3 # Import DebitCardPayment juga dari services
4 from services import IPaymentProcessor, ShoppingCart, CashPayment, DebitCardPayment
5 from models import Product
6
7 LOGGER = logging.getLogger('MAIN_APP')
8
9 class PosApp:
10     """Kelas Orchestrator (Aplikasi Utama). Hanya mengkoordinasi flow dan menerapkan DI."""
11
12     def __init__(self, repository: ProductRepository, payment_processor: IPaymentProcessor):
13         self.repository = repository
14         self.payment_processor = payment_processor
15         self.cart = ShoppingCart()
16         LOGGER.info("POS Application Initialized.")
17
18     def _display_menu(self):
19         LOGGER.info("\n--- DAFTAR PRODUK ---")
20         for p in self.repository.get_all():
21             LOGGER.info(f"[{p.id}] {p.name} - Rp{p.price:,.0f}")
22
23     def _handle_add_item(self):
24         product_id = input("Masukkan ID Produk: ").strip().upper()
25         product = self.repository.get_by_id(product_id)
26
27         if not product:
28             LOGGER.warning("Produk tidak ditemukan.")
29             return
30
31         try:
32             qty_input = input("Jumlah (default 1): ")
33             quantity = int(qty_input) if qty_input else 1
34             if quantity <= 0: raise ValueError
35             self.cart.add_item(product, quantity)
36         except ValueError:
37             LOGGER.error("Jumlah tidak valid.")
38
39     def _handle_checkout(self):
40         total = self.cart.total_price
41         if total == 0:
42             LOGGER.warning("Keranjang kosong.")
43             return
44
45         LOGGER.info(f"\nTotal Belanja: Rp{total:,.0f}")
46
47         # Menggunakan processor apapun yang di-inject saat init
48         success = self.payment_processor.process(total)
49
50         if success:
51             LOGGER.info("TRANSAKSI BERHASIL.")
52             self._print_receipt()
53             self.cart = ShoppingCart() # Reset cart
54         else:
55             LOGGER.error("TRANSAKSI GAGAL.")
56
57     def _print_receipt(self):
58         LOGGER.info("\n--- STRUK PEMBELIAN ---")
59         for item in self.cart.get_items():
60             LOGGER.info(f"{item.product.name} x{item.quantity} = Rp{item.subtotal:,.0f}")
61         LOGGER.info("-----")
62         LOGGER.info(f"TOTAL AKHIR: Rp{self.cart.total_price:,.0f}")
63         LOGGER.info("-----\n")
64
65 # TITIK MASUK UTAMA (Orchestration)
66 if __name__ == "__main__":
67     # Setup Logging
68     logging.basicConfig(level=logging.INFO, format='%(name)s - %(levelname)s - %(message)s')
69
70     # 1. Instantiate Lapisan Data
71     repo = ProductRepository()
72
73     # 2. Instantiate Service (JAWABAN LATIHAN MANDIRI)
74     # Kita ganti CashPayment() dengan DebitCardPayment().
75     # payment_method = CashPayment()
76     payment_method = DebitCardPayment()
77
78     # 3. Inject Dependencies ke Aplikasi Utama
79     # Perhatikan: Kita TIDAK mengubah kode di dalam kelas PosApp sama sekali.
80     app = PosApp(repository=repo, payment_processor=payment_method)
81
82     while True:
83         print("\n--- MENU KASIR (Mode: DEBIT) ---")
84         print("1. Tampilkan Produk")
85         print("2. Tambah ke Keranjang")
86         print("3. Checkout")
87         print("4. Keluar")
88
89         choice = input("Pilih (1-4): ")
90
91         if choice == "1":
92             app._display_menu()
93         elif choice == "2":
94             app._handle_add_item()
95         elif choice == "3":
96             app._handle_checkout()
97         elif choice == "4":
98             LOGGER.info("Bye bye.")
99             break
100         else:
101             LOGGER.warning("Menu tidak tersedia.")

```

## Output

```

MAIN_APP - INFO - ---
--- DAFTAR PRODUK ---
MAIN_APP - INFO - [P001] Laptop Gaming - Rp15,000,000
MAIN_APP - INFO - [P002] Mouse Wireless - Rp250,000
MAIN_APP - INFO - [P003] Keyboard Mech - Rp800,000

--- MENU KASIR (Mode: DEBIT) ---
1. Tampilkan Produk
2. Tambah ke Keranjang
3. Checkout
4. Keluar
Pilih (1-4): 2
Masukkan ID Produk: P001
Jumlah (default 1): 1
SERVICES - INFO - Added 1x Laptop Gaming to cart.

--- MENU KASIR (Mode: DEBIT) ---
1. Tampilkan Produk
2. Tambah ke Keranjang
3. Checkout
4. Keluar
Pilih (1-4): 3
MAIN_APP - INFO -
Total Belanja: Rp15,000,000
SERVICES - INFO - System: Menghubungkan ke Gateway Bank...
SERVICES - INFO - Bank: Memproses pemotongan saldo sebesar Rp15,000,000
SERVICES - INFO - Bank: Transaksi APPROVED.
MAIN_APP - INFO - TRANSAKSI BERHASIL.
MAIN_APP - INFO -
--- STRUK PEMBELIAN ---
MAIN_APP - INFO - Laptop Gaming x1 = Rp15,000,000
MAIN_APP - INFO - -----
MAIN_APP - INFO - TOTAL AKHIR: Rp15,000,000
MAIN_APP - INFO - -----

--- MENU KASIR (Mode: DEBIT) ---
1. Tampilkan Produk
2. Tambah ke Keranjang
3. Checkout
4. Keluar
Pilih (1-4): █

```

## Screenshoot history commit

Commits

History for `Praktikum_PBO / P12` on `main` All users All time

Commits on Dec 19, 2025

<b>Feat: Implementasi Logging untuk menggantikan print pada CheckoutService</b> Rainzy21 committed now	5237694	<a href="#">C</a> <a href="#">D</a> <a href="#">C</a>
<b>Docs: Menambahkan Google Style Docstrings pada CheckoutService</b> Rainzy21 committed 1 minute ago	35072e1	<a href="#">C</a> <a href="#">D</a> <a href="#">C</a>
<b>Refactor: Implementasi dasar SOLID CheckoutService tanpa dokumentasi</b> Rainzy21 committed 2 minutes ago	fab40c5	<a href="#">C</a> <a href="#">D</a> <a href="#">C</a>
<b>DELETE</b> Rainzy21 committed 6 minutes ago	34b6d26	<a href="#">C</a> <a href="#">D</a> <a href="#">C</a>
<b>first</b> Rainzy21 committed 11 minutes ago	bf6ac4e	<a href="#">C</a> <a href="#">D</a> <a href="#">C</a>
<b>P12</b> Rainzy21 committed 16 minutes ago	af749e2	<a href="#">C</a> <a href="#">D</a> <a href="#">C</a>
<b>first commit</b> Rainzy21 committed 43 minutes ago	852332c	<a href="#">C</a> <a href="#">D</a> <a href="#">C</a>

End of commit history for this file

**f. Refleksi singkat:**

Penggunaan Dependency Injection (DI) di PosApp terbukti sangat membantu dalam pengembangan sistem. Ketika saya menyelesaikan tantangan untuk mengganti cara pembayaran dari Tunai menjadi Debit, saya tidak perlu mengubah satu pun baris kode dalam logika utama PosApp. Saya perlu membuat kelas DebitCardPayment yang baru sesuai dengan kontrak antarmuka, kemudian 'menginjeksinya' dari luar (main\_app). Ini menunjukkan bahwa aplikasi menjadi lebih fleksibel, lebih mudah diuji, dan mengikuti prinsip Open/Closed Principle (terbuka untuk penambahan fitur baru, tertutup untuk perubahan pada kode yang sudah ada).