UNGUIDED
PEMROGRAMAN PERANGKAT BERGERAK

MODUL XV
DESIGN PATTERN

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PROGRAM STUDI S1 SOFTWARE ENGINEERING

FAKULTAS INFORMATIKA

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TUGAS PENDAHULUAN

1. SOAL

Tugas Mandiri (Unguided)

Dari tugas unguided modul 14 yang telah dikerjakan, ubahlah kodenya sehingga sesuai dengan salah satu design pattern yang telah dipelajari.

Note: Jangan lupa sertakan source code, screenshoot output, dan deskripsi program.

Kreatifitas menjadi nilai tambah

Main.dart

```dart
import 'package:flutter/material.dart';
import 'package:get/get.dart';
import 'view/home_screen.dart';

void main() {
  runApp(const MyApp());
}

class MyApp extends StatelessWidget {
  const MyApp({super.key});

  @override
  Widget build(BuildContext context) {
    return GetMaterialApp(
      title: 'FORM MODUL 15',
      debugShowCheckedModeBanner: false,
      theme: ThemeData(
        useMaterial3: true,
        primarySwatch: Colors.blue,

        appBarTheme: const AppBarTheme(
          elevation: 0,
          centerTitle: true,
        ),

        cardTheme: CardThemeData(
          elevation: 2,
          shape: RoundedRectangleBorder(
            borderRadius: BorderRadius.circular(12),
          ),
        ),

        inputDecorationTheme: InputDecorationTheme(
          contentPadding: const EdgeInsets.symmetric(
            horizontal: 16,
            vertical: 14,
          ),
          border: OutlineInputBorder(
            borderRadius: BorderRadius.circular(8),
            borderSide: const BorderSide(color: Colors.grey),
          ),
          focusedBorder: OutlineInputBorder(
            borderRadius: BorderRadius.circular(8),
            borderSide: const BorderSide(
              color: Colors.blue,
              width: 2,
            ),
          ),
        ),
      ),
      home: HomeScreen(),
    );
  }
}
```

action_buttons.dart

```dart
import 'package:flutter/material.dart';
import 'package:get/get.dart';
import 'package:unguidedlimabelas/viewmodel/mahasiswa_viewmodel.dart';

class ActionButtons extends StatelessWidget {
  final MahasiswaViewModel viewModel;

  const ActionButtons({super.key, required this.viewModel});

  @override
  Widget build(BuildContext context) {
    return Row(
      children: [

        Expanded(
          child: Obx(
            () => ElevatedButton(
              onPressed: viewModel.isLoading.value
                  ? null
                  : () {
                      if (viewModel.isEditMode.value) {
                        viewModel.updateData();
                      } else {
                        viewModel.addData();
                      }
                    },
              style: ElevatedButton.styleFrom(
                backgroundColor: viewModel.isEditMode.value
                    ? Colors.green
                    : Colors.blue,
                padding: const EdgeInsets.symmetric(vertical: 16),
                shape: RoundedRectangleBorder(
                  borderRadius: BorderRadius.circular(10),
                ),
                elevation: 2,
              ),
              child: Row(
                mainAxisAlignment: MainAxisAlignment.center,
                children: [
                  Icon(
                    viewModel.isEditMode.value
                        ? Icons.update
                        : Icons.add_circle,
                    color: Colors.white,
                    size: 20,
                  ),
                  const SizedBox(width: 8),
                  Text(
                    viewModel.isEditMode.value ? 'UPDATE' : 'TAMBAH',
                    style: const TextStyle(
                      fontWeight: FontWeight.bold,
                      fontSize: 16,
                      color: Colors.white,
```

```dart
                    ),
                  ),
                ],
              ),
            ),
          ),
        ),

        const SizedBox(width: 12),

        Obx(
          () => ElevatedButton(
            onPressed: viewModel.isLoading.value
                ? null
                : () => viewModel.fetchData(),
            style: ElevatedButton.styleFrom(
              backgroundColor: Colors.orange,
              padding: const EdgeInsets.symmetric(
                vertical: 16,
                horizontal: 24,
              ),
              shape: RoundedRectangleBorder(
                borderRadius: BorderRadius.circular(10),
              ),
              elevation: 2,
            ),
            child: const Row(
              children: [
                Icon(Icons.refresh, color: Colors.white, size: 20),
                SizedBox(width: 8),
                Text(
                  'GET',
                  style: TextStyle(
                    fontWeight: FontWeight.bold,
                    fontSize: 16,
                    color: Colors.white,
                  ),
                ),
              ],
            ),
          ),
        ),
      ],
    );
  }
}
```

mahasiswa_form.dart

```dart
import 'package:flutter/material.dart';
import 'package:get/get.dart';
import '../../viewmodel/mahasiswa_viewmodel.dart';

class MahasiswaForm extends StatelessWidget {
  final MahasiswaViewModel viewModel;

  const MahasiswaForm({super.key, required this.viewModel});

  @override
  Widget build(BuildContext context) {
    return Card(
      elevation: 3,
      shape: RoundedRectangleBorder(
        borderRadius: BorderRadius.circular(12),
      ),
      child: Padding(
        padding: const EdgeInsets.all(16),
        child: Column(
          crossAxisAlignment: CrossAxisAlignment.start,
          children: [

            Obx(
              () => Text(
                viewModel.isEditMode.value
                    ? 'Edit Data'
                    : 'Tambah Data Baru',
                style: TextStyle(
                  fontSize: 18,
                  fontWeight: FontWeight.bold,
                  color: Colors.blue[800],
                ),
              ),
            ),

            const SizedBox(height: 16),


            _buildTextField(
              label: 'Nama',
              icon: Icons.person,
              controller: viewModel.nameController,
            ),

            const SizedBox(height: 12),


            _buildTextField(
              label: 'NIM',
              icon: Icons.badge,
              controller: viewModel.nimController,
```

```dart
            ),
          ],
        ),
      ),
    );
  }

  Widget _buildTextField({
    required String label,
    required IconData icon,
    required TextEditingController controller,
  }) {
    return Column(
      crossAxisAlignment: CrossAxisAlignment.start,
      children: [
        Text(
          label,
          style: TextStyle(
            fontWeight: FontWeight.w500,
            color: Colors.grey[700],
          ),
        ),
        const SizedBox(height: 6),
        TextField(
          controller: controller,
          decoration: InputDecoration(
            prefixIcon: Icon(icon, color: Colors.blue[600]),
            filled: true,
            fillColor: Colors.white,
            contentPadding: const EdgeInsets.symmetric(
              horizontal: 12,
              vertical: 14,
            ),
            border: OutlineInputBorder(
              borderRadius: BorderRadius.circular(8),
              borderSide: BorderSide(color: Colors.grey[400]!),
            ),
            focusedBorder: OutlineInputBorder(
              borderRadius: BorderRadius.circular(8),
              borderSide: BorderSide(
                color: Colors.blue[600]!,
                width: 2,
              ),
            ),
          ),
        ),
      ],
    );
  }
}
```

mahasiswa_list.dart

```dart
import 'package:flutter/material.dart';
import 'package:get/get.dart';
import '../../model/mahasiswa_model.dart';
import '../../viewmodel/mahasiswa_viewmodel.dart';

class MahasiswaList extends StatelessWidget {
  final MahasiswaViewModel viewModel;

  const MahasiswaList({super.key, required this.viewModel});

  @override
  Widget build(BuildContext context) {
    return Obx(() {
      if (viewModel.isLoading.value) {
        return _buildLoadingIndicator();
      }

      if (viewModel.mahasiswaList.isEmpty) {
        return _buildEmptyState();
      }

      return ListView.builder(
        itemCount: viewModel.mahasiswaList.length,
        itemBuilder: (context, index) {
          final mahasiswa = viewModel.mahasiswaList[index];
          return _buildListItem(mahasiswa);
        },
      );
    });
  }

  Widget _buildLoadingIndicator() {
    return Center(
      child: Column(
        mainAxisAlignment: MainAxisAlignment.center,
        children: [
          const CircularProgressIndicator(
            strokeWidth: 3,
            valueColor: AlwaysStoppedAnimation<Color>(Colors.blue),
          ),
          const SizedBox(height: 16),
          Text(
            'Memuat data...',
            style: TextStyle(
              fontSize: 14,
              color: Colors.grey[600],
            ),
          ),
        ],
      ),
    );
  }

  Widget _buildEmptyState() {
    return Center(
      child: Column(
        mainAxisAlignment: MainAxisAlignment.center,
        children: [
          Icon(
            Icons.list_alt,
            size: 64,
            color: Colors.grey[400],
          ),
          const SizedBox(height: 16),
          const Text(
            'Belum ada data',
            style: TextStyle(
              fontSize: 16,
              color: Colors.grey,
              fontWeight: FontWeight.w500,
            ),
          ),
          const SizedBox(height: 8),
          Text(
            'Tekan tombol GET untuk mengambil data',
            style: TextStyle(
              fontSize: 12,
              color: Colors.grey[500],
            ),
          ),
        ],
      ),
    );
  }

  Widget _buildListItem(Mahasiswa mahasiswa) {
    return Card(
      elevation: 2,
      margin: const EdgeInsets.only(bottom: 12),
      shape: RoundedRectangleBorder(
        borderRadius: BorderRadius.circular(10),
      ),
      child: Padding(
        padding: const EdgeInsets.all(16),
        child: Row(
          children: [
            Container(
              width: 40,
              height: 40,
              decoration: BoxDecoration(
                color: Colors.blue[50],
                borderRadius: BorderRadius.circular(20),
              ),
              child: Icon(
                Icons.person,
                color: Colors.blue[600],
              ),
            ),

            const SizedBox(width: 16),

            Expanded(
              child: Column(
                crossAxisAlignment: CrossAxisAlignment.start,
                children: [
                  Text(
                    mahasiswa.name,
                    maxLines: 1,
                    overflow: TextOverflow.ellipsis,
                    style: const TextStyle(
                      fontWeight: FontWeight.bold,
                      fontSize: 16,
                    ),
                  ),
                  const SizedBox(height: 4),
                  Text(
                    mahasiswa.nim,
                    style: TextStyle(
                      fontSize: 14,
                      color: Colors.grey[600],
                    ),
                  ),
                  if (mahasiswa.createdAt != null)
                    Padding(
                      padding: const EdgeInsets.only(top: 4),
                      child: Text(
                        'Ditambahkan: ${mahasiswa.createdAt!.toLocal().toString().split('.')[0]}',
                        style: TextStyle(
                          fontSize: 10,
                          color: Colors.grey[500],
                        ),
                      ),
                    ),
                ],
              ),
            ),

            Row(
              children: [
                IconButton(
                  onPressed: () => viewModel.setEditMode(mahasiswa),
                  icon: Icon(Icons.edit, color: Colors.green[600]),
                  tooltip: 'Edit',
                  style: IconButton.styleFrom(
                    backgroundColor: Colors.green[50],
                    shape: RoundedRectangleBorder(
                      borderRadius: BorderRadius.circular(8),
                    ),
                  ),
                ),
                const SizedBox(width: 8),
                IconButton(
                  onPressed: () => _showDeleteDialog(mahasiswa),
                  icon: Icon(Icons.delete, color: Colors.red[600]),
                  tooltip: 'Hapus',
                  style: IconButton.styleFrom(
                    backgroundColor: Colors.red[50],
                    shape: RoundedRectangleBorder(
                      borderRadius: BorderRadius.circular(8),
                    ),
                  ),
                ),
              ],
            ),
          ],
        ),
      ),
    );
  }

  void _showDeleteDialog(Mahasiswa mahasiswa) {
    Get.defaultDialog(
      title: 'Konfirmasi Hapus',
      titleStyle: const TextStyle(
        fontWeight: FontWeight.bold,
        color: Colors.red,
      ),
      content: Column(
        children: [
          const Text('Apakah Anda yakin ingin menghapus data ini?'),
          const SizedBox(height: 8),
          Text(
            '${mahasiswa.name} (${mahasiswa.nim})',
            style: const TextStyle(
              fontWeight: FontWeight.bold,
            ),
          ),
        ],
      ),
      confirm: ElevatedButton(
        onPressed: () {
          Get.back();
          viewModel.deleteData(mahasiswa.id);
        },
        style: ElevatedButton.styleFrom(
          backgroundColor: Colors.red,
          padding: const EdgeInsets.symmetric(
            horizontal: 24,
            vertical: 12,
          ),
        ),
        child: const Text(
          'HAPUS',
          style: TextStyle(color: Colors.white),
        ),
      ),
      cancel: TextButton(
        onPressed: () => Get.back(),
        child: const Text('BATAL'),
      ),
    );
  }
}
```

Home_screen.dart

```dart
import 'package:flutter/material.dart';
import 'package:get/get.dart';
import '../viewmodel/mahasiswa_viewmodel.dart';
import 'widget/mahasiswa_form.dart';
import 'widget/action_buttons.dart';
import 'widget/mahasiswa_list.dart';

class HomeScreen extends StatelessWidget {
  HomeScreen({super.key});

  final MahasiswaViewModel viewModel =
      Get.put(MahasiswaViewModel());

  @override
  Widget build(BuildContext context) {
    return Scaffold(
      backgroundColor: Colors.grey[50],
      appBar: AppBar(
        centerTitle: true,
        elevation: 0,
        backgroundColor: Colors.blue[700],
        foregroundColor: Colors.white,
        title: const Text(
          'FORM MODUL 15',
          style: TextStyle(
            fontWeight: FontWeight.bold,
            fontSize: 22,
            letterSpacing: 0.5,
          ),
        ),
        actions: [
          Obx(
            () => viewModel.isEditMode.value
                ? IconButton(
                    onPressed: viewModel.cancelEdit,
                    icon: const Icon(Icons.close),
                    tooltip: 'Batal Edit',
                  )
                : const SizedBox(),
          ),
        ],
      ),
      body: Padding(
        padding: const EdgeInsets.all(16),
        child: Column(
          crossAxisAlignment: CrossAxisAlignment.stretch,
          children: [
            MahasiswaForm(viewModel: viewModel),

            const SizedBox(height: 20),

            // Action Buttons
            ActionButtons(viewModel: viewModel),

            const SizedBox(height: 20),

            // List Header
            _buildListHeader(),

            const SizedBox(height: 10),

            // List
            Expanded(
              child: MahasiswaList(viewModel: viewModel),
            ),
          ],
        ),
      ),
    );
  }

  Widget _buildListHeader() {
    return Row(
      mainAxisAlignment: MainAxisAlignment.spaceBetween,
      children: [
        const Text(
          'Daftar Mahasiswa',
          style: TextStyle(
            fontSize: 18,
            fontWeight: FontWeight.bold,
            color: Colors.black87,
          ),
        ),
        Obx(
          () => Text(
            'Total: ${viewModel.totalMahasiswa}',
            style: TextStyle(
              fontSize: 14,
              fontWeight: FontWeight.w500,
              color: Colors.blue[600],
            ),
          ),
        ),
      ],
    );
  }
}
```
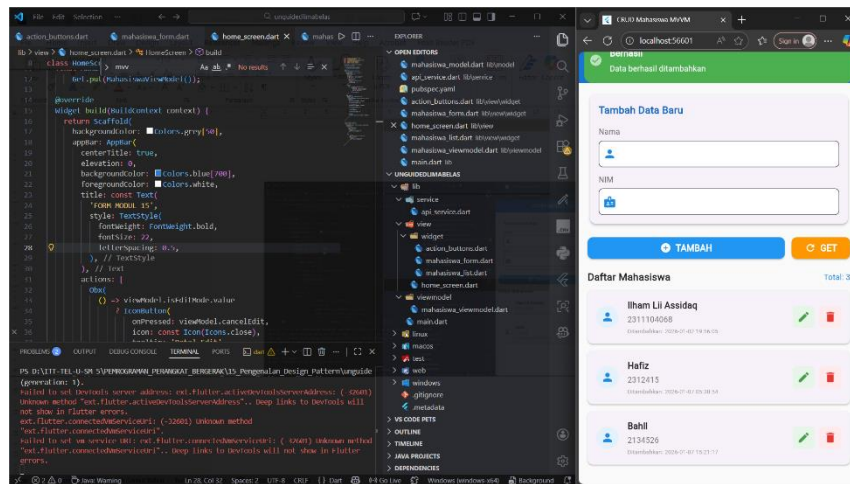
Mahasiswa_viewmodel.dart
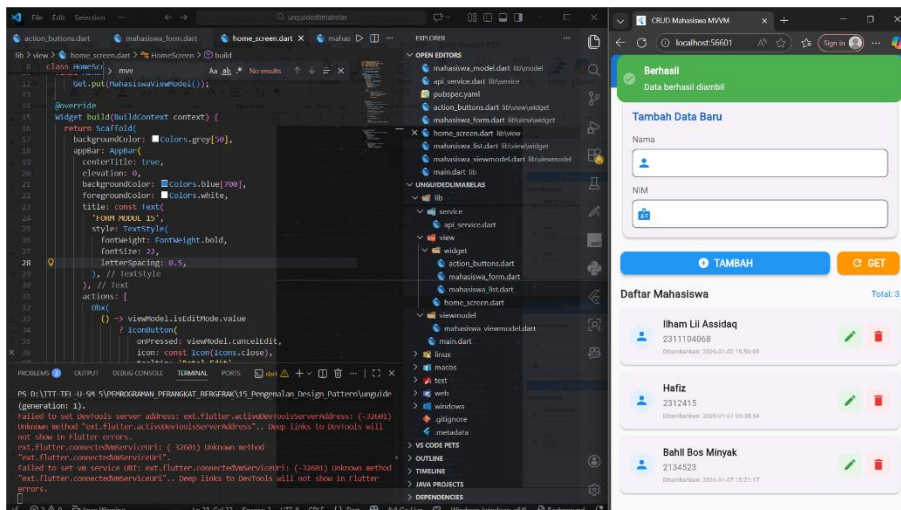
```dart
import 'package:flutter/material.dart';
import 'package:get/get.dart';
import '../model/mahasiswa_model.dart';
import '../service/api_service.dart';

class MahasiswaViewModel extends GetxController {
  final ApiService _apiService = ApiService();

  final RxList<Mahasiswa> mahasiswaList = <Mahasiswa>[].obs;
  final RxBool isLoading = false.obs;
  final RxBool isEditMode = false.obs;
  final RxString selectedId = ''.obs;
  final RxString errorMessage = ''.obs;

  final TextEditingController nameController =
      TextEditingController();
  final TextEditingController nimController =
      TextEditingController();

  int get totalMahasiswa => mahasiswaList.length;

  bool get hasError => errorMessage.isNotEmpty;

  bool get isFormValid =>
      nameController.text.isNotEmpty &&
      nimController.text.isNotEmpty;

  @override
  void onClose() {
    nameController.dispose();
    nimController.dispose();
    super.onClose();
  }

  Future<void> fetchData() async {
    try {
      isLoading(true);
      errorMessage('');

      final data = await _apiService.fetchMahasiswa();
      mahasiswaList.assignAll(data);

      showSuccessSnackbar('Data berhasil diambil');
    } catch (e) {
      errorMessage(e.toString());
      showErrorSnackbar('Gagal mengambil data');
    } finally {
      isLoading(false);
    }
  }

  Future<void> addData() async {
    if (!isFormValid) {
      showWarningSnackbar('Nama dan NIM tidak boleh kosong');
      return;
    }

    try {
      isLoading(true);
      errorMessage('');

      await _apiService.addMahasiswa(
        nameController.text,
        nimController.text,
      );

      await fetchData();
      clearForm();

      showSuccessSnackbar('Data berhasil ditambahkan');
    } catch (e) {
      errorMessage(e.toString());
      showErrorSnackbar('Gagal menambah data');
    } finally {
      isLoading(false);
    }
  }

  Future<void> updateData() async {
    if (selectedId.isEmpty) return;

    if (!isFormValid) {
      showWarningSnackbar('Nama dan NIM tidak boleh kosong');
      return;
    }

    try {
      isLoading(true);
      errorMessage('');

      await _apiService.updateMahasiswa(
        selectedId.value,
        nameController.text,
        nimController.text,
      );
```

```dart
      await fetchData();
      cancelEdit();

      showSuccessSnackbar('Data berhasil diperbarui');
    } catch (e) {
      errorMessage(e.toString());
      showErrorSnackbar('Gagal memperbarui data');
    } finally {
      isLoading(false);
    }
  }

  Future<void> deleteData(String id) async {
    try {
      isLoading(true);
      errorMessage('');

      await _apiService.deleteMahasiswa(id);
      await fetchData();

      showSuccessSnackbar('Data berhasil dihapus');
    } catch (e) {
      errorMessage(e.toString());
      showErrorSnackbar('Gagal menghapus data');
    } finally {
      isLoading(false);
    }
  }

  void setEditMode(Mahasiswa mahasiswa) {
    isEditMode(true);
    selectedId(mahasiswa.id);
    nameController.text = mahasiswa.name;
    nimController.text = mahasiswa.nim;
  }

  void cancelEdit() {
    isEditMode(false);
    selectedId('');
    clearForm();
  }

  void clearForm() {
    nameController.clear();
    nimController.clear();
  }

  void showSuccessSnackbar(String message) {
    Get.snackbar(
      'Berhasil',
      message,
      snackPosition: SnackPosition.TOP,
      backgroundColor: Colors.green,
      colorText: Colors.white,
      duration: const Duration(seconds: 2),
      icon: const Icon(Icons.check_circle, color: Colors.white),
    );
  }

  void showErrorSnackbar(String message) {
    Get.snackbar(
      'Error',
      message,
      snackPosition: SnackPosition.BOTTOM,
      backgroundColor: Colors.red,
      colorText: Colors.white,
      duration: const Duration(seconds: 3),
    );
  }

  void showWarningSnackbar(String message) {
    Get.snackbar(
      'Peringatan',
      message,
      snackPosition: SnackPosition.TOP,
      backgroundColor: Colors.orange,
      colorText: Colors.white,
    );
  }

  void updateMahasiswa() {}

  void addMahasiswa() {}
}
```
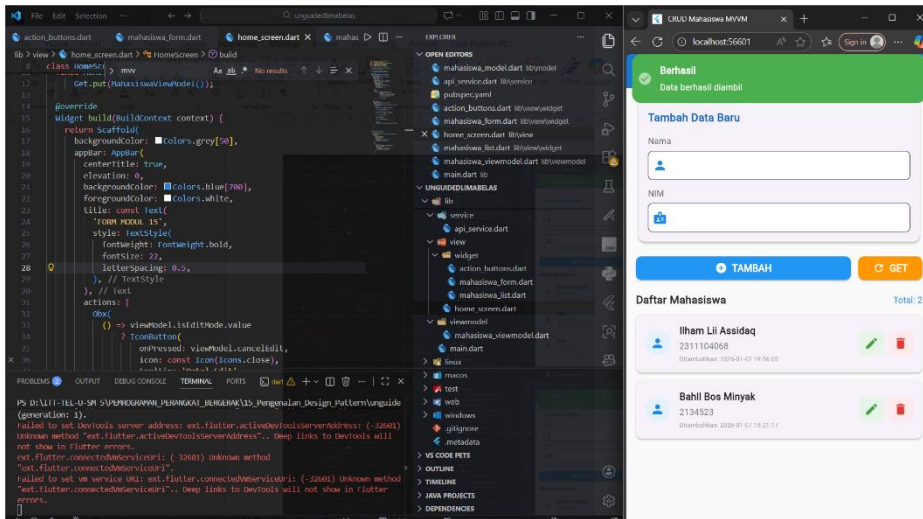
Screenshot Program

1. addMahasiswa

2. editMahasiswa

3. deleteMahasiswa

Penjelasan

Program Flutter ini menerapkan arsitektur MVVM (Model–View–ViewModel) dengan bantuan GetX sebagai state management. ApiService berperan sebagai lapisan service yang menangani komunikasi HTTP ke server (MockAPI), mencakup operasi CRUD seperti mengambil, menambah, memperbarui, dan menghapus data mahasiswa menggunakan metode GET, POST, PUT, dan DELETE. Data yang diterima dari API dikonversi dari format JSON ke objek Mahasiswa sehingga mudah dikelola di dalam aplikasi. Pendekatan ini memisahkan logika jaringan dari UI, membuat kode lebih terstruktur, mudah diuji, dan mudah dikembangkan.

MahasiswaViewModel berfungsi sebagai pusat logika aplikasi dan pengelola state dengan variabel reaktif (Rx) seperti mahasiswaList, isLoading, dan isEditMode. ViewModel juga menangani validasi form, proses submit data, serta menampilkan feedback ke pengguna melalui snackbar. Sementara itu, widget ActionButtons bertugas sebagai lapisan tampilan (View) yang hanya menangani interaksi pengguna. Dengan bantuan Obx, tampilan tombol secara otomatis menyesuaikan kondisi aplikasi (mode tambah/update dan loading) tanpa perlu setState. Kombinasi ini menghasilkan alur data yang jelas, UI yang responsif, dan menghindari kesalahan logika karena pemisahan tanggung jawab antar komponen.