

**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 kodennya 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



```
1 import 'package:flutter/material.dart';
2 import 'package:get/get.dart';
3 import 'view/home_screen.dart';
4
5 void main() {
6   runApp(const MyApp());
7 }
8
9 class MyApp extends StatelessWidget {
10   const MyApp({super.key});
11
12   @override
13   Widget build(BuildContext context) {
14     return GetMaterialApp(
15       title: 'FORM MODUL 15',
16       debugShowCheckedModeBanner: false,
17       theme: ThemeData(
18         useMaterial3: true,
19         primarySwatch: Colors.blue,
20
21         appBarTheme: const AppBarTheme(
22           elevation: 0,
23           centerTitle: true,
24         ),
25
26         cardTheme: CardThemeData(
27           elevation: 2,
28           shape: RoundedRectangleBorder(
29             borderRadius: BorderRadius.circular(12),
30           ),
31         ),
32
33         inputDecorationTheme: InputDecorationTheme(
34           contentPadding: const EdgeInsets.symmetric(
35             horizontal: 16,
36             vertical: 14,
37           ),
38           border: OutlineInputBorder(
39             borderRadius: BorderRadius.circular(8),
40             borderSide: const BorderSide(color: Colors.grey),
41           ),
42           focusedBorder: OutlineInputBorder(
43             borderRadius: BorderRadius.circular(8),
44             borderSide: const BorderSide(
45               color: Colors.blue,
46               width: 2,
47             ),
48           ),
49         ),
50       ),
51       home: HomeScreen(),
52     );
53   }
54 }
55 }
```

## action\_buttons.dart

```
1 import 'package:flutter/material.dart';
2 import 'package:get/get.dart';
3 import 'package:unguldedimbelas/viewmodel/mahasiswa_viewmodel.dart';
4
5 class ActionButtons extends StatelessWidget {
6   final MahasiswaViewModel viewModel;
7
8   const ActionButtons({super.key, required this.viewModel});
9
10  @override
11  Widget build(BuildContext context) {
12    return Row(
13      children: [
14
15        Expanded(
16          child: Obx(
17            () => ElevatedButton(
18              onPressed: viewModel.isLoading.value
19                ? null
20                : () {
21                  if (viewModel.isEditMode.value) {
22                    viewModel.updateData();
23                  } else {
24                    viewModel.addData();
25                  }
26                },
27              style: ElevatedButton.styleFrom(
28                backgroundColor: viewModel.isEditMode.value
29                  ? Colors.green
30                  : Colors.blue,
31                padding: const EdgeInsets.symmetric(vertical: 16),
32                shape: RoundedRectangleBorder(
33                  borderRadius: BorderRadius.circular(10),
34                ),
35                elevation: 2,
36              ),
37            child: Row(
38              mainAxisAlignment: MainAxisAlignment.center,
39              children: [
40                Icon(
41                  viewModel.isEditMode.value
42                    ? Icons.update
43                    : Icons.add_circle,
44                  color: Colors.white,
45                  size: 20,
46                ),
47                const SizedBox(width: 8),
48                Text(
49                  viewModel.isEditMode.value ? 'UPDATE' : 'TAMBAH',
50                  style: const TextStyle(
51                    fontWeight: FontWeight.bold,
52                    fontSize: 16,
53                    color: Colors.white,
54                  ),
55                ],
56              ],
57            ),
58          ),
59        ),
60      ],
61    );
62    const SizedBox(width: 12),
63
64    Obx(
65      () => ElevatedButton(
66        onPressed: viewModel.isLoading.value
67          ? null
68          : () => viewModel.fetchData(),
69        style: ElevatedButton.styleFrom(
70          backgroundColor: Colors.orange,
71          padding: const EdgeInsets.symmetric(
72            vertical: 16,
73            horizontal: 24,
74          ),
75          shape: RoundedRectangleBorder(
76            borderRadius: BorderRadius.circular(10),
77          ),
78          elevation: 2,
79        ),
80        child: const Row(
81          children: [
82            Icon(Icons.refresh, color: Colors.white, size: 20),
83            const SizedBox(width: 8),
84            Text(
85              'GET',
86              style: TextStyle(
87                fontWeight: FontWeight.bold,
88                fontSize: 16,
89                color: Colors.white,
90              ),
91            ),
92          ],
93        ),
94      ),
95    ],
96  );
97 }
98 }
99 }
```

## mahasiswa\_form.dart

```
1 import 'package:flutter/material.dart';
2 import 'package:get/get.dart';
3 import '../viewmodel/mahasiswa_viewmodel.dart';
4
5 class MahasiswaForm extends StatelessWidget {
6   final MahasiswaViewModel viewModel;
7
8   const MahasiswaForm({super.key, required this.viewModel});
9
10  @override
11  Widget build(BuildContext context) {
12    return Card(
13      elevation: 3,
14      shape: RoundedRectangleBorder(
15        borderRadius: BorderRadius.circular(12),
16      ),
17      child: Padding(
18        padding: const EdgeInsets.all(16),
19        child: Column(
20          crossAxisAlignment: CrossAxisAlignment.start,
21          children: [
22
23            Obx(
24              () => Text(
25                viewModel.isEditMode.value
26                  ? 'Edit Data'
27                  : 'Tambah Data Baru',
28                style: TextStyle(
29                  fontSize: 18,
30                  fontWeight: FontWeight.bold,
31                  color: Colors.blue[800],
32                ),
33              ),
34            ),
35
36            const SizedBox(height: 16),
37
38            _buildTextField(
39              label: 'Nama',
40              icon: Icons.person,
41              controller: viewModel.nameController,
42            ),
43
44            const SizedBox(height: 12),
45
46            _buildTextField(
47              label: 'NIM',
48              icon: Icons.badge,
49              controller: viewModel.nimController,
50            ),
51
52            const SizedBox(height: 16),
53
54            _buildTextField(
55              label: 'Email',
56              icon: Icons.email,
57              controller: viewModel.emailController,
58            ),
59
60            const SizedBox(height: 12),
61
62            _buildTextField(
63              label: 'Telepon',
64              icon: Icons.phone,
65              controller: viewModel.phoneController,
66            ),
67
68            const SizedBox(height: 12),
69
70            _buildTextField(
71              label: 'Alamat',
72              icon: Icons.location_on,
73              controller: viewModel.addressController,
74            ),
75
76            const SizedBox(height: 12),
77
78            _buildTextField(
79              label: 'Kota',
80              icon: Icons.location_city,
81              controller: viewModel.cityController,
82            ),
83
84            const SizedBox(height: 12),
85
86            _buildTextField(
87              label: 'Provinsi',
88              icon: Icons.location_pin,
89              controller: viewModel.provinceController,
90            ),
91
92            const SizedBox(height: 12),
93
94            _buildTextField(
95              label: 'Kode Pos',
96              icon: Icons.local_post_office,
97              controller: viewModel.zipCodeController,
98            ),
99
100           ],
101         );
102 }
```

## mahasiswa\_list.dart

```
1 import 'package:flutter/material.dart';
2 import 'package:get/get.dart';
3 import './model/mahasiswa_model.dart';
4 import './viewmodel/mahasiswa_viewmodel.dart';
5
6 class MahasiswaList extends StatelessWidget {
7   final MahasiswaViewModel viewModel;
8
9   const MahasiswaList({super.key, required this.viewModel});
10
11   @override
12   Widget build(BuildContext context) {
13     return Obx(() {
14       if (viewModel.isLoading.value) {
15         return _buildLoadingIndicator();
16       }
17
18       if (viewModel.mahasiswaList.isEmpty) {
19         return _buildEmptyState();
20       }
21
22       return ListView.builder(
23         itemCount: viewModel.mahasiswaList.length,
24         itemBuilder: (context, index) {
25           final mahasiswa = viewModel.mahasiswaList[index];
26           return _buildListItem(mahasiswa);
27         },
28       );
29     });
30   }
31
32   Widget _buildLoadingIndicator() {
33     return Center(
34       child: Column(
35         mainAxisAlignment: MainAxisAlignment.center,
36         children: [
37           const CircularProgressIndicator(
38             strokeWidth: 3,
39             valueColor: AlwaysStoppedAnimation<Color>(Colors.blue),
40           ),
41           const SizedBox(height: 16),
42           Text(
43             'Menantikan data...',
44             style: TextStyle(
45               fontSize: 14,
46               color: Colors.grey[600],
47             ),
48           ),
49         ],
50       ),
51     );
52   }
53 }
54
55 Widget _buildEmptyState() {
56   return Center(
57     child: Column(
58       mainAxisAlignment: MainAxisAlignment.center,
59       children: [
60         Icon(
61           Icons.list_alt,
62           size: 64,
63           color: Colors.grey[400],
64         ),
65         const SizedBox(height: 16),
66         const Text(
67           'Belum ada data',
68           style: TextStyle(
69             fontSize: 16,
70             color: Colors.grey,
71             fontWeight: FontWeight.w500,
72           ),
73         ),
74         const SizedBox(height: 8),
75         Text(
76           'Tekan tombol GET untuk mengambil data',
77           style: TextStyle(
78             fontSize: 12,
79             color: Colors.grey[500],
80           ),
81         ),
82       ],
83     );
84   );
85 }
86
87 Widget _buildListItem(Mahasiswa mahasiswa) {
88   return Card(
89     elevation: 2,
90     margin: const EdgeInsets.only(bottom: 12),
91     shape: RoundedRectangleBorder(
92       borderRadius: BorderRadius.circular(10),
93     ),
94     child: Padding(
95       padding: const EdgeInsets.all(16),
96       child: Row(
97         children: [
98           Container(
99             width: 48,
100             height: 48,
101             decoration: BoxDecoration(
102               color: Colors.blue[50],
103               borderRadius: BorderRadius.circular(20),
104             ),
105             child: Icon(
106               Icons.person,
107               color: Colors.blue[600],
108             ),
109           ),
110           const SizedBox(width: 16),
111         ],
112       ),
113     ),
114   );
115   Expanded(
116     child: Column(
117       crossAxisAlignment: CrossAxisAlignment.start,
118       children: [
119         Text(
120           mahasiswa.name,
121           maxLines: 1,
122           overflow: TextOverflow.ellipsis,
123           style: const TextStyle(
124             fontWeight: FontWeight.bold,
125             fontSize: 16,
126           ),
127         ),
128         const SizedBox(height: 4),
129         Text(
130           mahasiswa.nim,
131           style: TextStyle(
132             fontSize: 14,
133             color: Colors.grey[600],
134           ),
135         ),
136         if (mahasiswa.createdAt != null)
137           Padding(
138             padding: const EdgeInsets.only(top: 4),
139             child: Text(
140               'Ditambahkan: ${(mahasiswa.createdAt.toLocal().toString().split('.')[0])}',
141               style: TextStyle(
142                 fontSize: 10,
143                 color: Colors.grey[500],
144               ),
145             ),
146           ),
147         ],
148       ),
149     ),
150   ),
151   Row(
152     children: [
153     IconButton(
154       onPressed: () => viewModel.setEditable(mahasiswa),
155       icon: Icon(Icons.edit, color: Colors.green[500]),
156       tooltip: 'Edit',
157       style: IconButton.styleFrom(
158         backgroundColor: Colors.green[50],
159         shape: RoundedRectangleBorder(
160           borderRadius: BorderRadius.circular(8),
161         ),
162       ),
163     ),
164     const SizedBox(width: 8),
165     IconButton(
166       onPressed: () => _showDeleteDialog(mahasiswa),
167       icon: Icon(Icons.delete, color: Colors.red[500]),
168       tooltip: 'Hapus',
169       style: IconButton.styleFrom(
170         backgroundColor: Colors.red[50],
171         shape: RoundedRectangleBorder(
172           borderRadius: BorderRadius.circular(8),
173         ),
174       ),
175     ),
176   ],
177 ),
178 ],
179 ),
180 ),
181 );
182 }
183
184 void _showDeleteDialog(Mahasiswa mahasiswa) {
185   Get.defaultDialog(
186     title: 'Konfirmasi Hapus',
187     titleStyle: const TextStyle(
188       fontWeight: FontWeight.bold,
189       color: Colors.red,
190     ),
191     content: Column(
192       children: [
193         const Text('Apakah Anda yakin ingin menghapus data ini?'),
194         const SizedBox(height: 8),
195         Text(
196           '${mahasiswa.name} (${mahasiswa.nim})',
197           style: const TextStyle(
198             fontWeight: FontWeight.bold,
199           ),
200         ),
201       ],
202     ),
203   );
204 }
205
206 confirm: ElevatedButton(
207   onPressed: () {
208     Get.back();
209     viewModel.deleteData(mahasiswa.id);
210   },
211   style: ElevatedButton.styleFrom(
212     backgroundColor: Colors.red,
213     padding: const EdgeInsets.symmetric(
214       horizontal: 24,
215       vertical: 12,
216     ),
217   ),
218   child: const Text(
219     'HAPUS',
220     style: TextStyle(color: Colors.white),
221   ),
222   cancel: TextButton(
223     onPressed: () => Get.back(),
224     child: const Text('BATAL'),
225   ),
226 },
227 )
228 }
```

## Home\_screen.dart

```
56
57     // List Header
58     _buildListHeader(),
59
60     const SizedBox(height: 10),
61
62     // List
63     Expanded(
64         child: MahasiswaList(viewModel: viewModel),
65     ),
66 ],
67 ),
68 );
69 }
70 }
71
72 Widget _buildListHeader() {
73     return Row(
74         mainAxisAlignment: MainAxisAlignment.spaceBetween,
75         children: [
76             const Text(
77                 'Daftar Mahasiswa',
78                 style: TextStyle(
79                     fontSize: 18,
80                     fontWeight: FontWeight.bold,
81                     color: Colors.black87,
82                 ),
83             ),
84             Obx(
85                 () => Text(
86                     'Total: ${viewModel.totalMahasiswa}',
87                     style: TextStyle(
88                         fontSize: 14,
89                         fontWeight: FontWeight.w500,
90                         color: Colors.blue[600],
91                     ),
92                 ),
93             ),
94         ],
95     );
96 }
97 }
98 }
```

```
1 import 'package:flutter/material.dart';
2 import 'package:get/get.dart';
3 import '../viewmodel/mahasiswa_viewmodel.dart';
4 import 'widget/mahasiswa_form.dart';
5 import 'widget/action_buttons.dart';
6 import 'widget/mahasiswa_list.dart';
7
8 class HomeScreen extends StatelessWidget {
9     HomeScreen({super.key});
10
11     final MahasiswaViewModel viewModel =
12         Get.put(MahasiswaViewModel());
13
14     @override
15     Widget build(BuildContext context) {
16         return Scaffold(
17             backgroundColor: Colors.grey[50],
18             appBar: AppBar(
19                 centerTitle: true,
20                 elevation: 0,
21                 backgroundColor: Colors.blue[700],
22                 foregroundColor: Colors.white,
23                 title: const Text(
24                     'FORM MODUL 15',
25                     style: TextStyle(
26                         fontWeight: FontWeight.bold,
27                         fontSize: 22,
28                         letterSpacing: 0.5,
29                     ),
30                 ),
31                 actions: [
32                     Obx(
33                         () => viewModel.isEditMode.value
34                         ? IconButton(
35                             onPressed: viewModel.cancelEdit,
36                             icon: const Icon(Icons.close),
37                             tooltip: 'Batal Edit',
38                         )
39                         : const SizedBox(),
40                 ),
41             ],
42         ),
43         body: Padding(
44             padding: const EdgeInsets.all(16),
45             child: Column(
46                 crossAxisAlignment: CrossAxisAlignment.stretch,
47                 children: [
48                     MahasiswaForm(viewModel: viewModel),
49
50                     const SizedBox(height: 20),
51
52                     // Action Buttons
53                     ActionButtons(viewModel: viewModel),
54
55                     const SizedBox(height: 20),
56             ],
57         ),
58     );
59
60     // List Header
61     _buildListHeader(),
62
63     const SizedBox(height: 10),
64
65     // List
66     Expanded(
67         child: MahasiswaList(viewModel: viewModel),
68     ),
69 ]
70 );
71
72 Widget _buildListHeader() {
73     return Row(
74         mainAxisAlignment: MainAxisAlignment.spaceBetween,
75         children: [
76             const Text(
77                 'Daftar Mahasiswa',
78                 style: TextStyle(
79                     fontSize: 18,
80                     fontWeight: FontWeight.bold,
81                     color: Colors.black87,
82                 ),
83             ),
84             Obx(
85                 () => Text(
86                     'Total: ${viewModel.totalMahasiswa}',
87                     style: TextStyle(
88                         fontSize: 14,
89                         fontWeight: FontWeight.w500,
90                         color: Colors.blue[600],
91                     ),
92                 ),
93             ),
94         ],
95     );
96 }
97 }
98 }
```

## Mahasiswa\_viewmodel.dart

```
1 import 'package:flutter/material.dart';
2 import 'package:get/get.dart';
3 import '../model/mahasiswa_model.dart';
4 import '../service/api_service.dart';
5
6 class MahasiswaViewModel extends GetController {
7   final ApiService _apiService = ApiService();
8
9   final RxList<Mahasiswa> mahasiswaList = <Mahasiswa>[].obs;
10  final RxBool isLoading = false.obs;
11  final RxBool isEditMode = false.obs;
12  final RxString selectedId = ''.obs;
13  final RxString errorMessage = ''.obs;
14
15  final TextEditingController nameController =
16    TextEditingController();
17  final TextEditingController nimController =
18    TextEditingController();
19
20  int get totalMahasiswa => mahasiswaList.length;
21
22  bool get hasError => errorMessage.isNotEmpty;
23
24  bool get isFormValid =>
25    nameController.text.isNotEmpty &&
26    nimController.text.isNotEmpty;
27
28  @override
29  void onClose() {
30    nameController.dispose();
31    nimController.dispose();
32    super.onClose();
33  }
34
35  Future<void> fetchData() async {
36    try {
37      isLoading(true);
38      errorMessage('');
39
40      final data = await _apiService.fetchMahasiswa();
41      mahasiswaList.assignAll(data);
42
43      showSuccessSnackbar('Data berhasil diambil');
44    } catch (e) {
45      errorMessage(e.toString());
46      showErrorSnackbar('Gagal mengambil data');
47    } finally {
48      isLoading(false);
49    }
50  }
51
52
53  Future<void> addData() async {
54    if (!isFormValid) {
55      showWarningSnackbar('Nama dan NIM tidak boleh kosong');
56      return;
57    }
58
59    try {
60      isLoading(true);
61      errorMessage('');
62
63      await _apiService.addMahasiswa(
64        nameController.text,
65        nimController.text,
66      );
67
68      await fetchData();
69      clearForm();
70
71      showSuccessSnackbar('Data berhasil ditambahkan');
72    } catch (e) {
73      errorMessage(e.toString());
74      showErrorSnackbar('Gagal menambah data');
75    } finally {
76      isLoading(false);
77    }
78  }
79
80  Future<void> updateData() async {
81    if (selectedId.isEmpty) return;
82
83    if (!isFormValid) {
84      showWarningSnackbar('Nama dan NIM tidak boleh kosong');
85      return;
86    }
87
88    try {
89      isLoading(true);
90      errorMessage('');
91
92      await _apiService.updateMahasiswa(
93        selectedId.value,
94        nameController.text,
95        nimController.text,
96      );
97
98      await fetchData();
99      cancelEdit();
100
101     showSuccessSnackbar('Data berhasil diperbarui');
102   } catch (e) {
103     errorMessage(e.toString());
104     showErrorSnackbar('Gagal memperbarui data');
105   } finally {
106     isLoading(false);
107   }
108 }
109
110 Future<void> deleteData(String id) async {
111   try {
112     isLoading(true);
113     errorMessage('');
114
115     await _apiService.deleteMahasiswa(id);
116     await fetchData();
117
118     showSuccessSnackbar('Data berhasil dihapus');
119   } catch (e) {
120     errorMessage(e.toString());
121     showErrorSnackbar('Gagal menghapus data');
122   } finally {
123     isLoading(false);
124   }
125 }
126
127
128 void setEditMode(Mahasiswa mahasiswa) {
129   isEditMode(true);
130   selectedId(mahasiswa.id);
131   nameController.text = mahasiswa.name;
132   nimController.text = mahasiswa.nim;
133 }
134
135 void cancelEdit() {
136   isEditMode(false);
137   selectedId('');
138   clearForm();
139 }
140
141
142 void clearForm() {
143   nameController.clear();
144   nimController.clear();
145 }
146
147
148 void showSuccessSnackbar(String message) {
149   Get.snackbar(
150     'Berhasil',
151     message,
152     snackPosition: SnackPosition.TOP,
153     backgroundColor: Colors.green,
154     colorText: Colors.white,
155     duration: const Duration(seconds: 2),
156     icon: const Icon(Icons.check_circle, color: Colors.white),
157   );
158 }
159
160 void showErrorSnackbar(String message) {
161   Get.snackbar(
162     'Error',
163     message,
164     snackPosition: SnackPosition.BOTTOM,
165     backgroundColor: Colors.red,
166     colorText: Colors.white,
167     duration: const Duration(seconds: 3),
168   );
169 }
170
171 void showWarningSnackbar(String message) {
172   Get.snackbar(
173     'Peringatan',
174     message,
175     snackPosition: SnackPosition.TOP,
176     backgroundColor: Colors.orange,
177     colorText: Colors.white,
178   );
179 }
180
181 void updateMahasiswa() {}
182
183 void addMahasiswa() {}
184 }
185
```

## Screenshot Program

### 1. addMahasiswa

The screenshot shows the VS Code IDE with the file `home_screen.dart` open. The code contains logic for adding a new student to a database. In the browser window, a success message "Data berhasil ditambahkan" is displayed, and the student list shows three entries: Ilham Lili Assidaq, Hafiz, and Bahill.

```
class HomeScreen extends StatelessWidget {
  @override
  Widget build(BuildContext context) {
    return Scaffold(
      backgroundColor: Colors.blue[900],
      appBar: AppBar(
        title: const Text('FORM MODEL'),
        style: TextStyle(
          fontWeight: FontWeight.bold,
          fontSize: 22,
          letterSpacing: 0.5),
      ),
      body: Center(
        child: Column(
          mainAxisAlignment: MainAxisAlignment.spaceEvenly,
          children: [
            Container(
              padding: EdgeInsets.all(10),
              decoration: BoxDecoration(
                border: Border.all(
                  color: Colors.blue[900],
                  width: 2),
                color: Colors.white,
                borderRadius: BorderRadius.circular(10),
                boxShadow: [
                  BoxShadow(
                    color: Colors.blue[900].withOpacity(0.5),
                    offset: Offset(0, 10),
                    blurRadius: 10)
                ]
              ),
              child: Form(
                key: _formKey,
                autovalidateMode: AutovalidateMode.onUserInteraction,
                child: Column(
                  mainAxisSize: MainAxisSize.min,
                  children: [
                    TextFormField(
                      controller: namaController,
                      decoration: InputDecoration(
                        prefixIcon: Icon(Icons.person),
                        hintText: 'Nama',
                        border: OutlineInputBorder(
                          borderSide: BorderSide(
                            color: Colors.blue[900]
                          )
                        )
                      ),
                      validator: (value) {
                        if (value == null || value.isEmpty) {
                          return 'Nama tidak boleh kosong';
                        }
                      },
                    ),
                    TextFormField(
                      controller: nimController,
                      decoration: InputDecoration(
                        prefixIcon: Icon(Icons.school),
                        hintText: 'NIM',
                        border: OutlineInputBorder(
                          borderSide: BorderSide(
                            color: Colors.blue[900]
                          )
                        )
                      ),
                      validator: (value) {
                        if (value == null || value.isEmpty) {
                          return 'NIM tidak boleh kosong';
                        }
                      },
                    ),
                    ElevatedButton(
                      onPressed: () {
                        if (_formKey.currentState!.validate()) {
                          MahasiswaViewmodel().addMahasiswa(
                            MahasiswaViewmodel(
                              nama: namaController.text,
                              nim: nimController.text
                            )
                          );
                        }
                      },
                      style: ElevatedButton.styleFrom(
                        primary: Colors.blue[900],
                        padding: EdgeInsets.symmetric(
                          horizontal: 20,
                          vertical: 10),
                        shape: RoundedRectangleBorder(
                          borderRadius: BorderRadius.circular(10)
                        )
                      ),
                      child: Text('TAMBAH')
                    )
                  ],
                ),
              )
            )
          ],
        ),
      ),
    );
  }
}
```

### 2. editMahasiswa

The screenshot shows the VS Code IDE with the file `home_screen.dart` open. The code contains logic for updating a student's information. In the browser window, a success message "Data berhasil diambil" is displayed, and the student list shows three entries: Ilham Lili Assidaq, Hafiz, and Bahill Bos Minyak.

```
class HomeScreen extends StatelessWidget {
  @override
  Widget build(BuildContext context) {
    return Scaffold(
      backgroundColor: Colors.blue[900],
      appBar: AppBar(
        title: const Text('FORM MODEL'),
        style: TextStyle(
          fontWeight: FontWeight.bold,
          fontSize: 22,
          letterSpacing: 0.5),
      ),
      body: Center(
        child: Column(
          mainAxisAlignment: MainAxisAlignment.spaceEvenly,
          children: [
            Container(
              padding: EdgeInsets.all(10),
              decoration: BoxDecoration(
                border: Border.all(
                  color: Colors.blue[900],
                  width: 2),
                color: Colors.white,
                borderRadius: BorderRadius.circular(10),
                boxShadow: [
                  BoxShadow(
                    color: Colors.blue[900].withOpacity(0.5),
                    offset: Offset(0, 10),
                    blurRadius: 10)
                ]
              ),
              child: Form(
                key: _formKey,
                autovalidateMode: AutovalidateMode.onUserInteraction,
                child: Column(
                  mainAxisSize: MainAxisSize.min,
                  children: [
                    TextFormField(
                      controller: namaController,
                      decoration: InputDecoration(
                        prefixIcon: Icon(Icons.person),
                        hintText: 'Nama',
                        border: OutlineInputBorder(
                          borderSide: BorderSide(
                            color: Colors.blue[900]
                          )
                        )
                      ),
                      validator: (value) {
                        if (value == null || value.isEmpty) {
                          return 'Nama tidak boleh kosong';
                        }
                      },
                    ),
                    TextFormField(
                      controller: nimController,
                      decoration: InputDecoration(
                        prefixIcon: Icon(Icons.school),
                        hintText: 'NIM',
                        border: OutlineInputBorder(
                          borderSide: BorderSide(
                            color: Colors.blue[900]
                          )
                        )
                      ),
                      validator: (value) {
                        if (value == null || value.isEmpty) {
                          return 'NIM tidak boleh kosong';
                        }
                      },
                    ),
                    ElevatedButton(
                      onPressed: () {
                        if (_formKey.currentState!.validate()) {
                          MahasiswaViewmodel().editMahasiswa(
                            MahasiswaViewmodel(
                              id: idController.text,
                              nama: namaController.text,
                              nim: nimController.text
                            )
                          );
                        }
                      },
                      style: ElevatedButton.styleFrom(
                        primary: Colors.blue[900],
                        padding: EdgeInsets.symmetric(
                          horizontal: 20,
                          vertical: 10),
                        shape: RoundedRectangleBorder(
                          borderRadius: BorderRadius.circular(10)
                        )
                      ),
                      child: Text('TAMBAH')
                    )
                  ],
                ),
              )
            )
          ],
        ),
      ),
    );
  }
}
```

### 3. deleteMahasiswa

The screenshot shows the VS Code IDE with the file `home_screen.dart` open. The code contains logic for deleting a student from the database. In the browser window, a success message "Data berhasil diambil" is displayed, and the student list shows two entries: Ilham Lili Assidaq and Bahill Bos Minyak.

```
class HomeScreen extends StatelessWidget {
  @override
  Widget build(BuildContext context) {
    return Scaffold(
      backgroundColor: Colors.blue[900],
      appBar: AppBar(
        title: const Text('FORM MODEL'),
        style: TextStyle(
          fontWeight: FontWeight.bold,
          fontSize: 22,
          letterSpacing: 0.5),
      ),
      body: Center(
        child: Column(
          mainAxisAlignment: MainAxisAlignment.spaceEvenly,
          children: [
            Container(
              padding: EdgeInsets.all(10),
              decoration: BoxDecoration(
                border: Border.all(
                  color: Colors.blue[900],
                  width: 2),
                color: Colors.white,
                borderRadius: BorderRadius.circular(10),
                boxShadow: [
                  BoxShadow(
                    color: Colors.blue[900].withOpacity(0.5),
                    offset: Offset(0, 10),
                    blurRadius: 10)
                ]
              ),
              child: Form(
                key: _formKey,
                autovalidateMode: AutovalidateMode.onUserInteraction,
                child: Column(
                  mainAxisSize: MainAxisSize.min,
                  children: [
                    TextFormField(
                      controller: namaController,
                      decoration: InputDecoration(
                        prefixIcon: Icon(Icons.person),
                        hintText: 'Nama',
                        border: OutlineInputBorder(
                          borderSide: BorderSide(
                            color: Colors.blue[900]
                          )
                        )
                      ),
                      validator: (value) {
                        if (value == null || value.isEmpty) {
                          return 'Nama tidak boleh kosong';
                        }
                      },
                    ),
                    TextFormField(
                      controller: nimController,
                      decoration: InputDecoration(
                        prefixIcon: Icon(Icons.school),
                        hintText: 'NIM',
                        border: OutlineInputBorder(
                          borderSide: BorderSide(
                            color: Colors.blue[900]
                          )
                        )
                      ),
                      validator: (value) {
                        if (value == null || value.isEmpty) {
                          return 'NIM tidak boleh kosong';
                        }
                      },
                    ),
                    ElevatedButton(
                      onPressed: () {
                        if (_formKey.currentState!.validate()) {
                          MahasiswaViewmodel().deleteMahasiswa(
                            MahasiswaViewmodel(
                              id: idController.text
                            )
                          );
                        }
                      },
                      style: ElevatedButton.styleFrom(
                        primary: Colors.blue[900],
                        padding: EdgeInsets.symmetric(
                          horizontal: 20,
                          vertical: 10),
                        shape: RoundedRectangleBorder(
                          borderRadius: BorderRadius.circular(10)
                        )
                      ),
                      child: Text('TAMBAH')
                    )
                  ],
                ),
              )
            )
          ],
        ),
      ),
    );
  }
}
```

## 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 snackbars. 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.