**PRAKTIKUM STRUKTUR DATA SEMESTER GASAL 2025/2026**

**Pertemuan P03 (15-19 September 2025)**

**MODUL MATRIKS**

**PETUNJUK UNTUK PRAKTIKAN:**

1. Kerjakan **sendiri** tugas praktikum untuk berlatih. Kompetensi memprogram Anda akan dipertanggungjawabkan di dunia kerja nanti.
2. Bila ada tugas kelompok, kerjakan dan tuliskan porsi Anda.
3. Di dalam setiap file, tuliskan deskripsi program/modul, nama/NIM pembuat, dan tanggal pembuatan

/\*Deskripsi: \*/

/\*Pembuat: \*/

/\*Tanggal: \*/

1. Jadwal praktikum terbatas **2 jam** bersama Asisten, Anda harus menambah lagi praktikum mandiri minimal **120 menit**.
2. Konsultasikan dengan asisten bila menemui kendala.

**AGENDA:**

1. Asisten mendemonstrasikan cara:
   1. membuat projek program C standar (ANSI).
   2. membuat folder kerja dengan format khusus.
   3. membuat file header "matriks.h".
   4. memprogram dengan PINTAR di file body "matriks.c"
   5. menyimpan dan mengkompilasi modul.
   6. membuat file driver "mmatriks.c" dan pembangunan projek.
   7. eksekusi dan penirkutuan program.
2. Praktikan mengunduh file tugas di <https://bit.ly/strukdat25>.
3. Praktikan mengerjakan tugas praktikum.
4. Asisten mendampingi praktikan yang terkendala.
5. Praktikan mengumpulkan laporan penyelesaian tugas.
6. Asisten melaporkan kendala dan perkembangan belajar praktikan.

**DESKRIPSI TUGAS:**

1. Buatlah projek dan folder kerja hari ini dengan format: <nim>\_SD03, contoh: 24060119110023\_SD03.
2. Simpanlah file HEADER (**matriks.h**), file BODY (**matriks.c**), dan file DRIVER (**mmatriks.c**) ke dalam folder kerja.
3. Pelajari file header, tambahkan keterangan program, #ifndef, #define, #endif kemudian lakukan kompilasi.
4. Tambahkan deskripsi dan header (#include "matriks.h") pada awal file BODY maupun file DRIVER.
5. Salinlah prosedur/fungsi dari file HEADER ke file BODY.
6. Buatlah realisasi body fungsi/prosedur dalam file BODY, satu demi satu. Gantilah tanda ";" menjadi "{}", tambahkan komentar kamus lokal dan algoritma.
7. Periksalah realisasi body, kemudian lakukan kompilasi/(*re*)*build* projek.
8. Setiap selesai merealisasikan SEBUAH fungsi/prosedur, buatlah aplikasi pemanggilan fungsi/prosedur tersebut dalam file DRIVER kemudian uji (*run*) file DRIVER tersebut.
9. Pada AKHIR SESI praktikum, laporkan hasil praktikum pada tautan berikut <https://bit.ly/sd25lap>.
10. Lanjutkan melengkapi fungsi/prosedur di luar sesi praktikum, kemudian setorkan file \*.h dan \*.c via Kulon maksimal 3 hari setelah waktu praktikum.

**OPERASI MATRIKS**

1. Transpose Matriks

|  |  |  |  |
| --- | --- | --- | --- |
|  | 1 | 2 | 3 |
| 1 | 1 | 2 | 3 |
| 2 | 4 | 5 | 6 |
| 3 | 7 | 8 | 9 |
| 4 | 1 | 2 | 3 |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | 1 | 2 | 3 | 4 |
| 1 | 1 | 4 | 7 | 1 |
| 2 | 2 | 5 | 8 | 2 |
| 3 | 3 | 6 | 9 | 3 |

1. Padding

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | 1 | 2 | 3 | 4 | 5 |
| 1 | 0 | 0 | 0 | 0 | 0 |
| 2 | 0 | 1 | 2 | 3 | 0 |
| 3 | 0 | 4 | 5 | 6 | 0 |
| 4 | 0 | 7 | 8 | 9 | 0 |
| 5 | 0 | 1 | 2 | 3 | 0 |
| 6 | 0 | 0 | 0 | 0 | 0 |

Ukuran padding = 1

|  |  |  |  |
| --- | --- | --- | --- |
|  | 1 | 2 | 3 |
| 1 | 1 | 2 | 3 |
| 2 | 4 | 5 | 6 |
| 3 | 7 | 8 | 9 |
| 4 | 1 | 2 | 3 |

Ukuran padding = 2

|  |  |  |  |
| --- | --- | --- | --- |
|  | 1 | 2 | 3 |
| 1 | 1 | 2 | 3 |
| 2 | 4 | 5 | 6 |
| 3 | 7 | 8 | 9 |
| 4 | 1 | 2 | 3 |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 3 | 0 | 0 | 1 | 2 | 3 | 0 | 0 |
| 4 | 0 | 0 | 4 | 5 | 6 | 0 | 0 |
| 5 | 0 | 0 | 7 | 8 | 9 | 0 | 0 |
| 6 | 0 | 0 | 1 | 2 | 3 | 0 | 0 |
| 7 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 8 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

1. Average Pooling

pool size = 2, stride = 2

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | 1 | 2 | 3 | 4 | 5 | 6 |
| 1 | 1 | 3 | 2 | 4 | 3 | 5 |
| 2 | 1 | 3 | 2 | 4 | 3 | 5 |
| 3 | 2 | 4 | 3 | 5 | 1 | 3 |
| 4 | 2 | 4 | 3 | 5 | 1 | 3 |
| 5 | 1 | 3 | 2 | 4 | 3 | 5 |
| 6 | 1 | 3 | 2 | 4 | 3 | 5 |

|  |  |  |  |
| --- | --- | --- | --- |
|  | 1 | 2 | 3 |
| 1 | 2 | 3 | 4 |
| 2 | 3 | 4 | 2 |
| 3 | 2 | 3 | 4 |

1. Max Pooling

Pool size = 2, stride = 2

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | 1 | 2 | 3 | 4 | 5 | 6 |
| 1 | 1 | 3 | 2 | 4 | 3 | 5 |
| 2 | 1 | 3 | 2 | 4 | 3 | 5 |
| 3 | 2 | 4 | 3 | 5 | 1 | 3 |
| 4 | 2 | 4 | 3 | 5 | 1 | 3 |
| 5 | 1 | 3 | 2 | 4 | 3 | 5 |
| 6 | 1 | 3 | 2 | 4 | 3 | 5 |

|  |  |  |  |
| --- | --- | --- | --- |
|  | 1 | 2 | 3 |
| 1 | 3 | 4 | 5 |
| 2 | 4 | 5 | 3 |
| 3 | 3 | 4 | 5 |

1. Konvolusi

Matriks inout berukuran 5x5, matriks kernel berukuran 3x3, stride =1, sehingga matriks output berukuran 3x3

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | 1 | 2 | 3 | 4 | 5 |
| 1 | 1 | 2 | 3 | 4 | 5 |
| 2 | 1 | 2 | 3 | 4 | 5 |
| 3 | 1 | 2 | 3 | 4 | 5 |
| 4 | 1 | 2 | 3 | 4 | 5 |
| 5 | 1 | 2 | 3 | 4 | 5 |

|  |  |  |  |
| --- | --- | --- | --- |
|  | 1 | 2 | 3 |
| 1 | 0 | 0 | 0 |
| 2 | 0 | 1 | 0 |
| 3 | 0 | 0 | 0 |

|  |  |  |  |
| --- | --- | --- | --- |
|  | 1 | 2 | 3 |
| 1 | 2 | 3 | 4 |
| 2 | 2 | 3 | 4 |
| 3 | 2 | 3 | 4 |

Cell[1,1] = (1x0) + (2x0) + (3x0) + (1x0) + (2x1) + (3x0) + (1x0) + (2x0) + (3x0) = 2

Cell[1,2] = (2x0) + (3x0) + (4x0) + (2x0) + (3x1) + (4x0) + (2x0) + (3x0) + (4x0) = 3

Cell[1,3] = (3x0) + (4x0) + (5x0) + (3x0) + (4x1) + (5x0) + (3x0) + (4x0) + (5x0) = 4

Cell[2,1] = (1x0) + (2x0) + (3x0) + (1x0) + (2x1) + (3x0) + (1x0) + (2x0) + (3x0) = 2

Cell[2,2] = (2x0) + (3x0) + (4x0) + (2x0) + (3x1) + (4x0) + (2x0) + (3x0) + (4x0) = 3

Cell[2,3] = (3x0) + (4x0) + (5x0) + (3x0) + (4x1) + (5x0) + (3x0) + (4x0) + (5x0) = 4

Cell[3,1] = (1x0) + (2x0) + (3x0) + (1x0) + (2x1) + (3x0) + (1x0) + (2x0) + (3x0) = 2

Cell[3,2] = (2x0) + (3x0) + (4x0) + (2x0) + (3x1) + (4x0) + (2x0) + (3x0) + (4x0) = 3

Cell[3,3] = (3x0) + (4x0) + (5x0) + (3x0) + (4x1) + (5x0) + (3x0) + (4x0) + (5x0) = 4