

- Dead line
4/6/2022

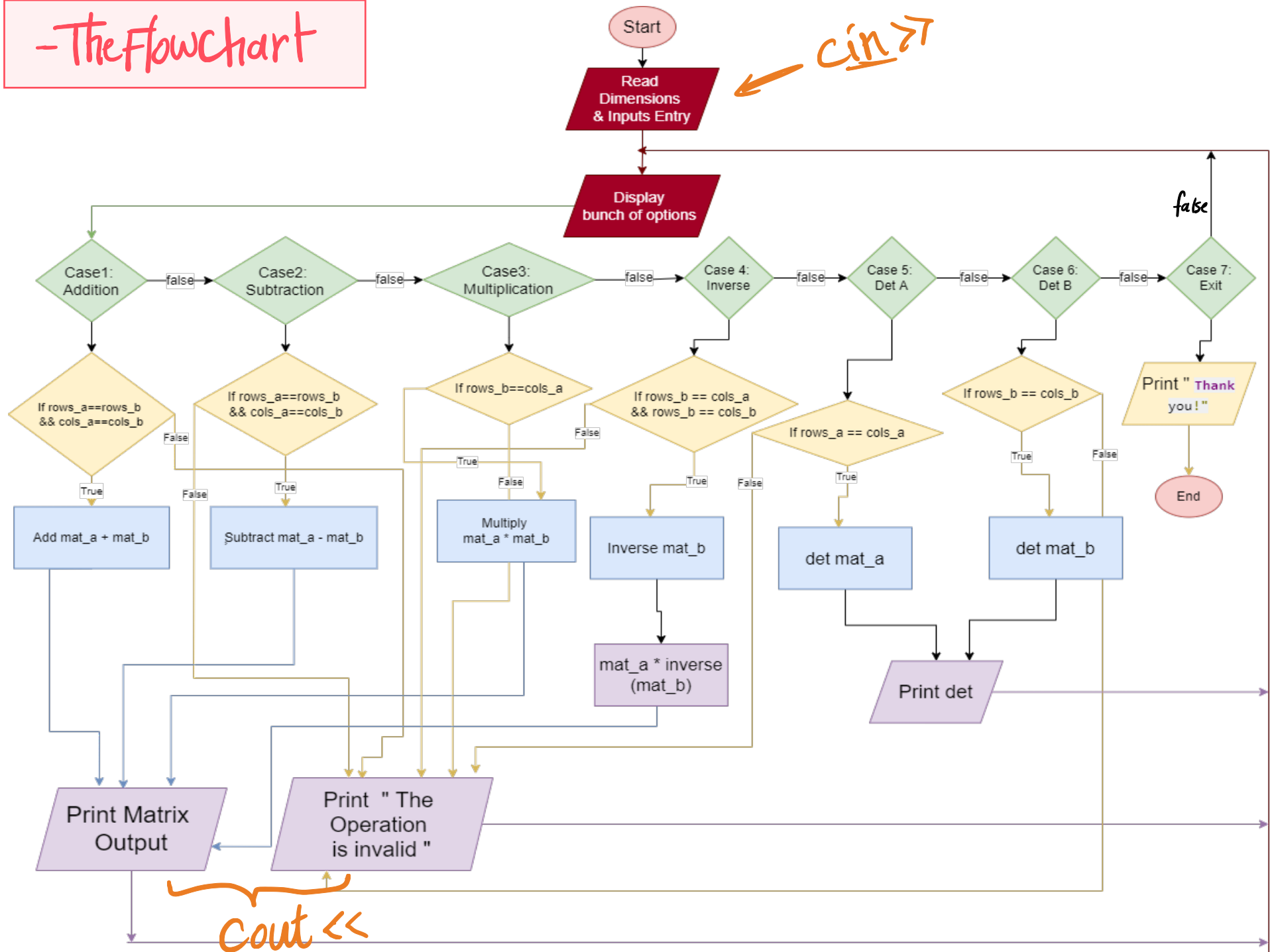


CSE131: Computer Programming
Codeforces Coteest Project
Electrical Sophomore

- Supervisor: Eng/Ahmed Fathy

ليثي سيفين عايد
- Name: yassa seifen Aged
- Code: 2001307
- Sec: 13

-The Flowchart



Case 1&2: Addition & Subtraction

The image shows a C++ IDE with a file named `final0.cpp` open. The code defines functions for calculating the determinant of a 3x3 matrix and performing Laplace subtraction. The `main` function prompts the user to enter dimensions and values for two matrices, A and B, and then asks for an operation type (Addition, Subtraction, etc.).

```
1 #include <iostream>
2 #include <cmath>
3 #include <string>
4 using namespace std;
5
6
7 // Yassa Seifen - 2001307
8 // 31/5/2022
9
10 long double get_det (auto mat[10][10] , int size ) ; * warning:
11 void laplace_sub (auto mat[10][10], auto temp[10][10] , int siz
12
13 int main (){
14     int rows_a,cols_a,rows_b,cols_b;
15     int mat_a[10][10];
16     int mat_b[10][10];
17
18     // Asking for Dimensions
19     cout<<"Please enter dimensions of Matrix A:" <<endl;
20     cin >> rows_a >> cols_a;
21     cout<<"Please enter dimensions of Matrix B:" <<endl;
22     cin >> rows_b >> cols_b;
23
24     // Getting the inner values of Matrices
25     cout<<"Please enter values of Matrix A:"<<endl;
26     for(int r=0;r<rows_a;r++){
27         for(int c=0;c<cols_a;c++){
28             cin >> mat_a[r][c];
29         }
30     }
31     cout<<"Please enter values of Matrix B:"<<endl;
32     for(int r=0;r<rows_b;r++){
33         for(int c=0;c<cols_b;c++){
```

The terminal window shows the following input and output:

```
final0 - call final0
Please enter dimensions of Matrix A:
3 3
Please enter dimensions of Matrix B:
3 3
Please enter values of Matrix A:
1 2 3
4 5 6
7 8 9
Please enter values of Matrix B:
1 2 3
4 5 6
7 8 9
Please choose operation type(1: A+B, 2: A-B, 3: AxB, 4: A*inverse
(B), 5: |A|, 6: |B|, 7: quit):
1
2 4 6
8 10 12
14 16 18
Please choose operation type(1: A+B, 2: A-B, 3: AxB, 4: A*inverse
(B), 5: |A|, 6: |B|, 7: quit):
7
Thank you!
D:\Sophomore Electrical 2nd Term\Computer Programming\Workspace C
& C++\Project Alpha>
```

Line 22, Column 33 Spaces: 4 C++

Case 3: Matrix Multiplication

The screenshot displays a C++ development environment with a source code editor and a terminal window.

Source Code (final0.cpp):

```
82         cout<<"\n";
83     }
84 }
85 else {
86     cout<<"The operation you chose is invalid for the";
87 }
88 goto choose_section;
89 }
90
91 case 3:{
92     if (rows_b==cols_a)
93     {
94         for(int r=0;r<rows_a;r++){
95             for(int c=0;c<cols_b;c++){
96                 multi_mat[r][c]=0;
97                 for(int z=0;z<cols_a;z++){
98                     multi_mat[r][c]= multi_mat[r][c] +
99                     }
100             }
101         }
102         for(int r=0;r<rows_a;r++){
103             for(int c=0;c<cols_b;c++){
104                 cout<< lround(multi_mat[r][c])<<" ";
105             }
106             cout<<"\n";
107         }
108     }
109     else {
110         cout<<"The operation you chose is invalid for the";
111     }
112     goto choose_section; }
113
114
```

Terminal Output (final0 - call final0):

```
Please enter dimensions of Matrix A:
3 3
Please enter dimensions of Matrix B:
3 3
Please enter values of Matrix A:
1 2 3
4 5 6
7 8 9
Please enter values of Matrix B:
1 2 3
4 5 6
7 8 9
Please choose operation type(1: A+B, 2: A-B, 3: AxB, 4: A*inverse
(B), 5: |A|, 6: |B|, 7: quit):
3
30 36 42
66 81 96
102 126 150
Please choose operation type(1: A+B, 2: A-B, 3: AxB, 4: A*inverse
(B), 5: |A|, 6: |B|, 7: quit):
7
Thank you!
D:\Sophomore Electrical 2nd Term\Computer Programming\Workspace C
& C++\Project Alpha>
```

IDE Status Bar: Files\JetBrains\PyCharm Community Edition 2021.2.3\bin;;C:\MinGW\bin;C:\MinGW\]; Line 102, Column 47; Spaces: 4; C++

Case4: Matrix Division

The screenshot displays a C++ IDE with a project named 'Project Alpha'. The main editor window shows the code for 'final0.cpp', which implements matrix division. The code includes a function 'case 4' that checks if the determinant of matrix B is non-zero. If it is, it calculates the inverse of matrix B using Laplace's method and then multiplies matrix A by the inverse of B to get the result. The output window shows the program's execution, where the user enters the dimensions and values of matrices A and B, chooses the division operation (4), and receives the resulting matrix.

```
112     goto choose_section; }
113
114
115 case 4 :{
116     Long double detb = get_det(mat_b, rows_b);
117     if (detb == 0 ){
118         cout << "The operation you chose is invalid for the given m
119     }
120
121     else{
122
123         if (rows_b == cols_a && rows_b == cols_b){
124             double inverseb[10][10] , AinverseB [10][10] , submat[10
125
126             // inverse calculation
127             for(int i=0 ; i< rows_b ; i++){
128                 for(int j=0;j< rows_b;j++){
129
130                     laplace_sub(mat_b,submat ,rows_b , i,j );
131                     inverseb[j][i] = (pow(-1 , i+j)*(get_det(submat,rows_
132                 }
133             }
134
135             // multiply
136             for(int r=0;r<rows_a;r++){
137                 for(int c=0;c<cols_b;c++){
138                     AinverseB[r][c]=0;
139                     for(int z=0;z<cols_a;z++){
140                         AinverseB[r][c]= AinverseB[r][c] + mat_a
141                     }
142                 }
143             }
144         }
```

final0 - call final0

Please enter dimensions of Matrix A:
3 2
Please enter dimensions of Matrix B:
2 2
Please enter values of Matrix A:
1 2
4 5
6 7
Please enter values of Matrix B:
1 2
3 4
Please choose operation type(1: A+B, 2: A-B, 3: AxB, 4: A*inverse
(B), 5: |A|, 6: |B|, 7: quit):
4
1 0
-1 2
-2 3
Please choose operation type(1: A+B, 2: A-B, 3: AxB, 4: A*inverse
(B), 5: |A|, 6: |B|, 7: quit):
7
Thank you!

D:\Sophomore Electrical 2nd Term\Computer Programming\Workspace C
& C++\Project Alpha>
D:\Sophomore Electrical 2nd Term\Computer Programming\Workspace C

Line 136, Column 44 Spaces: 4 C++

Case 5 & 6: Matrix Determinant

The screenshot shows a C++ IDE with a file explorer on the left, a code editor in the center, and a terminal window on the right. The code editor displays the implementation of a program that calculates the determinant of a matrix and performs operations based on user input. The terminal window shows the program's execution, including prompts for matrix dimensions and values, and the user's input.

```
final0.cpp
154     cout << "The operation you chose is invalid for the given matrices." << endl;
155     }
156 }
157 goto choose_section;
158 }
159
160 case 5: {
161     if (rows_a == cols_a)
162     {
163         Long long int det_a = get_det(mat_a, rows_a);
164         cout << det_a << endl;
165     }
166
167     else {
168         cout << "The operation you chose is invalid for the given matrices." << endl;
169         goto choose_section;
170     }
171
172 case 6: {
173     if (rows_b == cols_b)
174     {
175         Long long int det_b = get_det(mat_b, rows_b);
176         cout << det_b << endl;
177     }
178
179     else {
180         cout << "The operation you chose is invalid for the given matrices." << endl;
181         goto choose_section;
182     }
183 }
184
185 goto choose_section;
186 }
```

final0 - call final0

```
Please enter dimensions of Matrix A:
3 2
Please enter dimensions of Matrix B:
2 2
Please enter values of Matrix A:
1 2
3 4
5 6
Please enter values of Matrix B:
1 2
3 4
Please choose operation type(1: A+B, 2: A-B, 3: AxB, 4: A*inverse
(B), 5: |A|, 6: |B|, 7: quit):
5
The operation you chose is invalid for the given matrices.
Please choose operation type(1: A+B, 2: A-B, 3: AxB, 4: A*inverse
(B), 5: |A|, 6: |B|, 7: quit):
6
-2
Please choose operation type(1: A+B, 2: A-B, 3: AxB, 4: A*inverse
(B), 5: |A|, 6: |B|, 7: quit):
7
Thank you!
```

D:\Sophomore Electrical 2nd Term\Computer Programming\Workspace C++\Project Alpha\final0.cpp (Workspace C & C++) - Sublime Text (UNREGISTERED)

Line 169, Column 22 Spaces: 4 C++

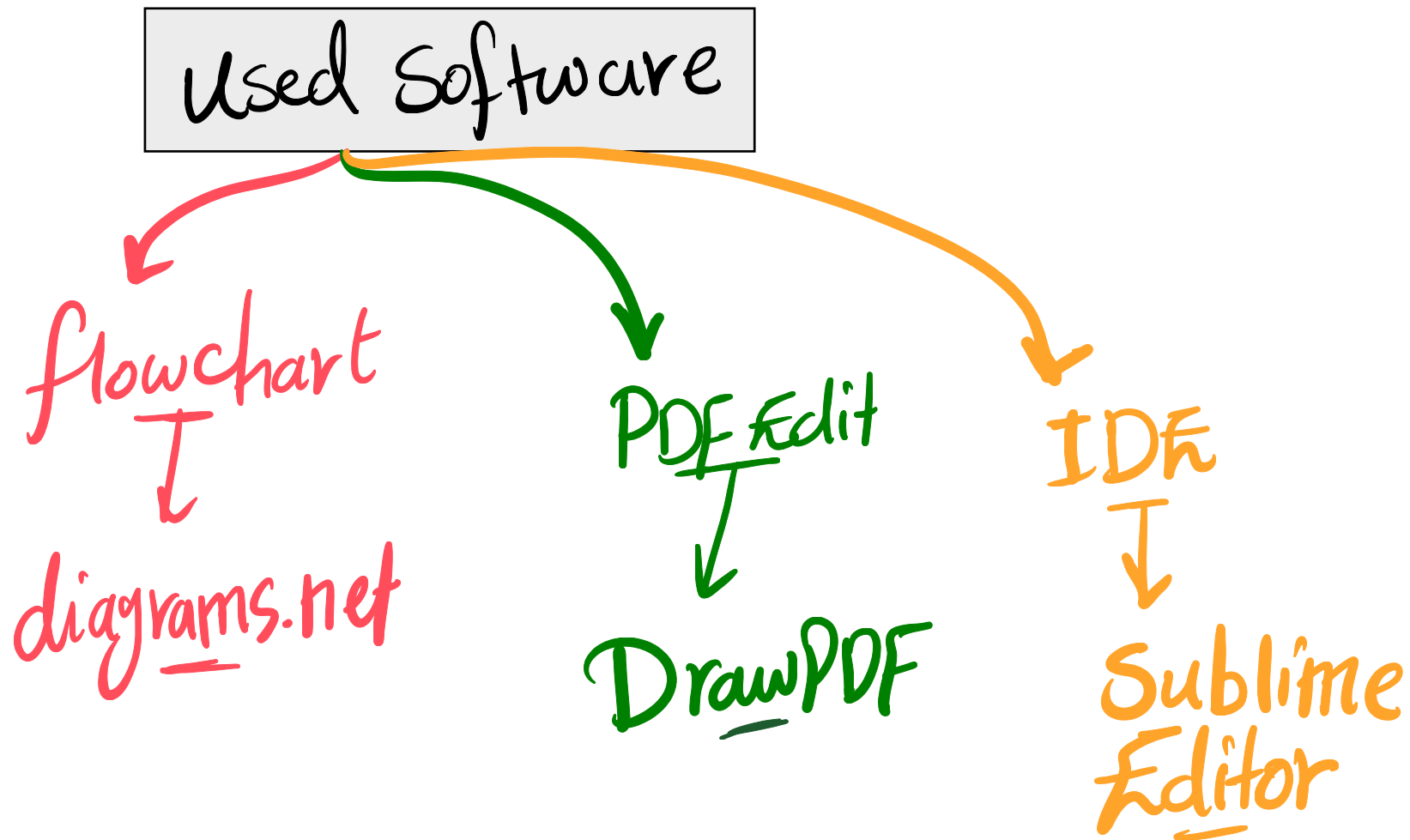
Last: YxZ Matrix Calculator

The screenshot displays a C++ IDE with a project named 'Project Alpha' containing several C++ files. The file 'final0.cpp' is open, showing a program that calculates the determinant of a matrix and performs various operations based on user input. The code includes a function for Laplace expansion and a main function that handles user input for matrix dimensions and operations.

```
173
174     if (rows_b == cols_b)
175     {
176         Long Long int det_b = get_det(mat_b, rows_b);
177         cout << det_b << endl;
178     }
179
180
181
182     else {
183         cout << "The operation you chose is invalid for the given matrix." << endl;
184     }
185     goto choose_section;
186
187 case 7:
188     cout << "Thank you!" << endl;
189     return 0;
190
191 default:
192     cout << "The operation you chose is invalid for the given matrix." << endl;
193     goto choose_section;
194 }
195
196 // based on Laplace Expansion
197 void laplace_sub (auto mat[10][10], auto temp[10][10], int size, int row_ed, int col_ed) {
198     for (int r = 0; r < size; r++) {
199         for (int c = 0; c < size; c++) {
200             if (c != col_ed && r != row_ed) {
201                 temp[r][c] = mat[r][c];
202             }
203         }
204     }
205 }
```

The terminal window shows the execution of the program. It prompts the user to enter dimensions for Matrix A and Matrix B, then values for each matrix. It then asks for an operation type (1: A+B, 2: A-B, 3: AxB, 4: A*inverse(B), 5: |A|, 6: |B|, 7: quit). The user enters 4 for the operation type, and the program outputs the result of the operation. Finally, the user enters 7 to quit, and the program outputs "Thank you!"

D:\Sophomore Electrical 2nd Term\Computer Programming\Workspace C & C++\Project Alpha>



- Used Laplace Expansion for the idea of sub-matrix loops.