## Student Details

| Repository Name | DBS25F020 |
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| Registration Number | 2024-CS-06, 2024-CS-16, 2024-CS-59 |

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| ***Project*** |  |
| Project Title | **Agriculture Management System** |
| Executive Summary | This project is about to create an easy to use system for farmers which helps in farming and managing the lands. It is made as a Window Forms application using C# and to store all the information it is connected with the MySQL Database. This system is designed in 3 tier model i.e User Interface, Business Layer, Database Layer. The purpose of this project is to help the farmers to manage their records, farms, crops, fertilizers and stock. Farmer can login and use it to see his farms information, he can add the crops he planted, make a record of his equipment and look after the products in stock. He can consult Experts in any regards. This system can also be used by Experts to give response to farmer questions. Application has a simple design. Grids are used to show data about farms, crops, stock etc. It also helps farmer to perform CRUD operations on many products. Farmers can also manage the water usage, resources like tube wells or canals, and keep track of how much usage hour of the land. It also helps farmer to manage fertilizers and other agricultural products like pesticides, seeds. Farmer enters the quantity he used, price of product and for which crop. It has many features but one of them is its ability to generate reports in PDF. These reports contain the data entered by farmer and saved for generating reports in future. The system also supports searching and filtering of files and records specially in grids farmer can search all he want in this way farmer can easily find what they need. Everything is connected to eachother and forms are shown in a way which is very easy to understand. The aim is to support small and big farmers by giving them a proper digital record-keeping managemnt system. |

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| ***Login Form*** |  |
| |  |  |  |  | | --- | --- | --- | --- | | UI Component Name | Type of UI Component | Class & Attribute Name | Linked Database Table/Column | | txtUsername | TextBox | LoginUsername | users (username) | | txtPassword | TextBox | LoginPassword | users (password) | | btnLogin | Button | ValidateLogin() | SELECT \* FROM users WHERE username=@Username AND password=@Password | | lblForgotPassword | Label | OpenPasswordRecovery | N/A | | lblTitle | Label | LoginFormTitle | N/A | | |

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| ***SignUp Form*** |  |
| |  |  |  |  | | --- | --- | --- | --- | | **UI Component Name** | **Type of UI Component** | **Class & Attribute Name** | **Linked Database Table/Column** | | txtEmail | TextBox | User.Email | users.email | | btnVerifyEmail | Button | VerifyEmail() | users (SELECT \* FROM users WHERE email = @Email) | | txtNewPassword | TextBox | User.Password | users.password | | btnResetPassword | Button | ResetPassword() | users (UPDATE users SET password = @NewPassword WHERE email = @Email) | | label4 | Label | FormTitle | N/A | | |

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| ***Admin Form*** |
| |  |  |  |  | | --- | --- | --- | --- | | UI Component Name | Type of UI Component | Class & Attribute Name | Linked Database Table/Column | | dgvExpertApps | DataGridView | dgvExpertApplications | expert\_applications (SELECT id, name, email, specialty FROM expert\_applications WHERE status='Pending') | | dgvFraudReports | DataGridView | dgvFraudReports | fraud\_reports (SELECT id, reporter\_id, expert\_id, report\_type FROM fraud\_reports) | | dgvEquipment | DataGridView | dgvEquipment | equipment (SELECT id, name FROM equipment) | | dgvCrops | DataGridView | dgvCrops | crops (SELECT id, name FROM crops) | | dgvProductRequests | DataGridView | dgvProductRequests | product\_requests (SELECT id, farmer\_id, product\_type FROM product\_requests) |   In case of column, write column name and in case of multiple columns, write query in last column | |

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| ***FarmerDashboard Form*** |
| |  |  |  |  | | --- | --- | --- | --- | | UI Component Name | Type of UI Component | Class & Attribute Name | Linked Database Table/Column | | ;dgvWeatherForecast | DataGridView | WeatherForecast | weather\_data | | lstAlerts | ListBox | AlertList |  | | progressStorage | ProgressBar | StorageCapacity | inventory (SELECT SUM(quantity)/SUM(capacity) FROM storage) | | progressSeason | ProgressBar | SeasonProgress | N/A | | dataGridViewRecent | DataGridView | RecentActivities | activities (SELECT \* FROM activities ORDER BY date DESC LIMIT 10) |   In case of column, write column name and in case of multiple columns, write query in last column | |

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| ***Agri\_Products Form*** |
| |  |  |  |  | | --- | --- | --- | --- | | UI Component Name | Type of UI Component | Class & Attribute Name | Linked Database Table/Column | | dgvAgriProducts | DataGridView | grdstock | agri\_products (SELECT id, name, quantity FROM agri\_products WHERE farmer\_id=@id) | | cmbCategory | ComboBox | comboBox1 | product\_categories (SELECT DISTINCT category FROM agri\_products) | | txtProductName | TextBox | txtagriname | agri\_products.name | | txtManufacturer | TextBox | txtcompany | agri\_products.manufacturer | | numQuantity | NumericUpDown | numericUpDown3 | agri\_products.quantity | | numPrice | NumericUpDown | numericUpDown1 | agri\_products.price | | dtpExpiry | DateTimePicker | Expiry | agri\_products.expiry\_date | | btnAddProduct | Button | btnaddagri | agri\_products (INSERT) | | |

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| ***Expert Advice Form*** |
| |  |  |  |  | | --- | --- | --- | --- | | UI Component Name | Type of UI Component | Class & Attribute Name | Linked Database Table/Column | | tabControlExpert | TabControl | ConsultationTabs | N/A | | tabRequest | TabPage | RequestTab | N/A | | txtSearch | TextBox | SearchRequests | requests (SELECT \* FROM requests WHERE title LIKE '%@Search%') | | btnSearch | Button | SearchRequests() | SELECT \* FROM requests | | grdrequest | DataGridView | RequestList | SELECT \* FROM requests | | cmbpurpose | ComboBox | RequestPurpose | N/A | | cmbrequestype | ComboBox | RequestType | N/A | | btnaddrequest | Button | AddRequest() | INSERT INTO requests | | tabexpertresponse | TabPage | ResponseTab | N/A | | txtResponse | TextBox | ExpertResponse | N/A | | btnSubmitResponse | Button | SubmitResponse() | UPDATE requests SET response=@Response |   In case of column, write column name and in case of multiple columns, write query in last column | |

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| ***Crop Form*** |
| |  |  |  |  | | --- | --- | --- | --- | | UI Component Name | Type of UI Component | Class & Attribute Name | Linked Database Table/Column | | txtSearch | TextBox | SearchCrops | crops (SELECT \* FROM crops WHERE name LIKE '%@Search%') | | btnSearch | Button | SearchCrops() | SELECT \* FROM crops | | grdlands | DataGridView | CropsList | SELECT \* FROM crops | | comboBox1 | ComboBox | CropName | crops (name) | | comboBox2 | ComboBox | CropStatus | N/A | | comboBox3 | ComboBox | Season | N/A | | comboBox4 | ComboBox | Year | N/A | | txtarea | TextBox | CropArea | N/A | | btnAddCrop | Button | AddCrop() | INSERT INTO crops |   In case of column, write column name and in case of multiple columns, write query in last column | |

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| ***Equipment Form*** |
| |  |  |  |  | | --- | --- | --- | --- | | UI Component Name | Type of UI Component | Class & Attribute Name | Linked Database Table/Column | | txtSearch | TextBox | SearchEquipment | equipment (SELECT \* FROM equipment WHERE name LIKE '%@Search%') | | btnSearch | Button | SearchEquipment() | SELECT \* FROM equipment | | grdEquipments | DataGridView | EquipmentList | SELECT \* FROM equipment | | cmbequipment | ComboBox | EquipmentType | equipment\_types | | cmbStatus | ComboBox | EquipmentStatus | N/A | | cmbvendorname | ComboBox | VendorName | vendors | | cmbrentequipment | ComboBox | RentalEquipment | equipment | | btnnewvendor | Button | AddVendor() | INSERT INTO vendors | | btnowned | Button | AddOwnedEquipment() | INSERT INTO equipment |   In case of column, write column name and in case of multiple columns, write query in last column | |

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| ***Info Form*** |
| |  |  |  |  | | --- | --- | --- | --- | | UI Component Name | Type of UI Component | Class & Attribute Name | Linked Database Table/Column | | lblTitle | Label | label4 | Experts.full\_name | | txtFirstName | TextBox | txtFname | Experts.first\_name | | txtLastName | TextBox | txtLname | Experts.last\_name | | mtxtCNIC | MaskedTextBox | CNICmask | Experts.cnic | | mtxtContact | MaskedTextBox | Contactmask | Experts.contact\_number | | dtpDOB | DateTimePicker | Dob | Experts.date\_of\_birth | | txtAddress | TextBox | txtAdress | Experts.address | | btnSave | Button | btnSave | Experts (INSERT/UPDATE) |   In case of column, write column name and in case of multiple columns, write query in last column | |

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| ***Land Form*** |
| |  |  |  |  | | --- | --- | --- | --- | | UI Component Name | Type of UI Component | Class & Attribute Name | Linked Database Table/Column | | txtSearch | TextBox | SearchLands | lands (SELECT \* FROM lands WHERE location LIKE '%@Search%') | | btnSearch | Button | SearchLands() | SELECT \* FROM lands | | grdlands | DataGridView | LandList | SELECT \* FROM lands | | txtsoil | TextBox | SoilType | N/A | | txtarea | TextBox | LandArea | N/A | | txtAddress | TextBox | LandAddress | N/A | | btnAddLand | Button | AddLand() | INSERT INTO lands | | btnDeleteLand | Button | DeleteLand() | DELETE FROM lands WHERE id=@ID |   In case of column, write column name and in case of multiple columns, write query in last column | |

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| ***Request Resources Form*** |
| |  |  |  |  | | --- | --- | --- | --- | | UI Component Name | Type of UI Component | Class & Attribute Name | Linked Database Table/Column | | tabControlExpert | TabControl | ReportTabs | N/A | | tabReport | TabPage | ReportTab | N/A | | txtSearch | TextBox | SearchReports | reports (SELECT \* FROM reports WHERE title LIKE '%@Search%') | | btnSearch | Button | SearchReports() | SELECT \* FROM reports | | grdstock | DataGridView | ReportList | SELECT \* FROM reports | | cmbcrop | ComboBox | ExpertName | experts | | txttitle | TextBox | ReportTitle | N/A | | txtdes | TextBox | ReportDescription | N/A | | btnReport | Button | SubmitReport() | INSERT INTO reports | | tabsuggestion | TabPage | SuggestionTab | N/A | | textBox3 | TextBox | SuggestionTitle | N/A | | textBox2 | TextBox | SuggestionDescription | N/A | | btnsuggest | Button | SubmitSuggestion() | INSERT INTO suggestions |   In case of column, write column name and in case of multiple columns, write query in last column | |

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| ***Stock Inventory Form*** |
| |  |  |  |  | | --- | --- | --- | --- | | UI Component Name | Type of UI Component | Class & Attribute Name | Linked Database Table/Column | | dgvInventory | DataGridView | grdstock | inventory (SELECT id, product\_name, quantity FROM inventory WHERE farmer\_id=@id) | | cmbCrop | ComboBox | cmbcrop | crops (SELECT id, name FROM crops) | | numStockQuantity | NumericUpDown | numericUpDown1 | inventory.quantity | | btnAddStock | Button | btnaddstock | inventory (INSERT) |   In case of column, write column name and in case of multiple columns, write query in last column | |

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| ***Vendor Profile Form*** |
| |  |  |  |  | | --- | --- | --- | --- | | UI Component Name | Type of UI Component | Class & Attribute Name | Linked Database Table/Column | | txtVendorFirstName | TextBox | txtFname | vendors.first\_name | | txtVendorLastName | TextBox | txtLname | vendors.last\_name | | mtxtVendorCNIC | MaskedTextBox | CNICmask | vendors.cnic | | mtxtVendorPhone | MaskedTextBox | Contactmask | vendors.phone | | txtVendorAddress | TextBox | txtAddress | vendors.address | | btnAddVendor | Button | btnaddvendor | vendors (INSERT) |   In case of column, write column name and in case of multiple columns, write query in last column | |

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| ***Expert Dashboard Form*** |  |
| |  |  |  |  | | --- | --- | --- | --- | | UI Component Name | Type of UI Component | Class & Attribute Name | Linked Database Table/Column | | dgvConsultations | DataGridView | gridFramerRequest | consultations (SELECT id, farmer\_name, request\_type, details FROM consultations WHERE expert\_id=@id) | | txtExpertResponse | TextBox | txtResponse | consultations.response | | btnSubmitResponse | Button | btnSubmitResponse | consultations (UPDATE response WHERE id=@selected\_id) | | |

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| ***Educational Info Form*** |  |
| |  |  |  |  | | --- | --- | --- | --- | | UI Component Name | Type of UI Component | Class & Attribute Name | Linked Database Table/Column | | cmbDegreeType | ComboBox | comboBox1 | Education.degree\_type | | txtRollNo | TextBox | txtEmail | Education.roll\_number | | numObtainedMarks | NumericUpDown | numericUpDown1 | Education.obtained\_marks | | numTotalMarks | NumericUpDown | numericUpDown2 | Education.total\_marks | | numCGPA | NumericUpDown | numericUpDown3 | Education.gpa | | cmbPassingYear | ComboBox | comboBox2 | Education.passing\_year | | txtDescription | TextBox | textBox1 | Education.description | | btnSaveEducation | Button | button3 | Education (INSERT/UPDATE) | | |

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| ***Water Resources Form*** |  |
| |  |  |  |  | | --- | --- | --- | --- | | UI Component Name | Type of UI Component | Class & Attribute Name | Linked Database Table/Column | | txtSearch | TextBox | SearchWaterResources | water\_resources (SELECT \* FROM water\_resources WHERE type LIKE '%@Search%') | | btnSearch | Button | SearchWaterResources() | SELECT \* FROM water\_resources | | grdstock | DataGridView | WaterResourceList | SELECT \* FROM water\_resources | | cmbwater | ComboBox | WaterType | N/A | | cmbplanted | ComboBox | PlantedCrop | crops | | numericUpDown5 | NumericUpDown | UsageHours | N/A | | btnusage | Button | RecordUsage() | INSERT INTO water\_usage | | btnaddagri | Button | AddWaterResource() | INSERT INTO water\_resources | | |

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| ***Business Report-1*** |  |
| *Business Report Name: Water Consumption Report* | |
| *Sample of report:* | |
| *Query to build Report****: SELECT p.planted\_id, p.crop\_type, p.field\_location, SUM(wu.usage\_hours) AS total\_water\_hours, SUM(wu.total\_cost) AS total\_water\_cost, AVG(wu.usage\_hours) AS avg\_daily\_hours***  ***FROM***  ***water\_usage wu***  ***JOIN***  ***planted\_areas p ON wu.planted\_id = p.planted\_id***  ***WHERE***  ***wu.usage\_date BETWEEN @start\_date AND @end\_date***  ***GROUP BY***  ***p.planted\_id, p.crop\_type, p.field\_location***  ***ORDER BY***  ***total\_water\_hours DESC;*** | |

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| ***Business Report-2*** |  |
| *Business Report Name: Crop Yield Report* | |
| *Sample of report:* | |
| *Query to build Report* ***SELECT***  ***p.planted\_id,***  ***p.crop\_type,***  ***p.field\_location,***  ***p.planting\_date,***  ***p.harvest\_date,***  ***p.expected\_yield,***  ***p.actual\_yield,***  ***(p.actual\_yield / NULLIF(p.expected\_yield, 0)) \* 100 AS yield\_percentage,***  ***SUM(wu.usage\_hours) AS total\_water\_hours,***  ***SUM(wu.total\_cost) AS total\_water\_cost***  ***FROM***  ***planted\_areas p***  ***LEFT JOIN***  ***water\_usage wu ON p.planted\_id = wu.planted\_id***  ***GROUP BY***  ***p.planted\_id, p.crop\_type, p.field\_location, p.planting\_date,***  ***p.harvest\_date, p.expected\_yield, p.actual\_yield***  ***ORDER BY***  ***yield\_percentage DESC;*** | |

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| ***Business Report-3*** |  |
| *Business Report Name: Crop Production Report* | |
| *Sample of report:* | |
| *Query to build Report* ***SELECT fp.farmer\_id, CONCAT(fp.first\_name, ' ', fp.last\_name) AS farmer\_name, pc.p\_id AS planting\_id, c.crop\_name, pc.year, pc.season, pc.area AS planted\_area, SUM(wu.usage\_hours) AS total\_water\_hours, SUM(wu.total\_cost) AS water\_cost, cb.quantity AS harvested\_quantity, cb.price AS market\_price, (cb.quantity \* cb.price) AS estimated\_revenue***  ***FROM***  ***farmer\_profile fp***  ***JOIN***  ***planted\_crops pc ON fp.farmer\_id = pc.farmer\_id***  ***JOIN***  ***crop c ON pc.crop\_id = c.crop\_id***  ***LEFT JOIN***  ***water\_usage wu ON pc.p\_id = wu.planted\_id***  ***LEFT JOIN***  ***crop\_batch cb ON cb.purpose = 'Harvested'***  ***AND cb.batch\_id IN (SELECT crop\_batch\_id FROM crop\_stock WHERE crop\_name = c.crop\_name)***  ***WHERE***  ***pc.year = YEAR(CURDATE())***  ***GROUP BY***  ***fp.farmer\_id, pc.p\_id, c.crop\_id, cb.batch\_id***  ***ORDER BY***  ***estimated\_revenue DESC; WHEN 2 THEN 'Fulfilled' END AS Status***  ***FROM faculty\_requests***  ***JOIN faculty ON faculty\_requests.faculty\_id = faculty.faculty\_id***  ***JOIN consumables ON faculty\_requests.item\_id = consumables.consumable\_id;*** | |

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| ***Business Report-4*** |  |
| *Business Report Name: Rental Equipments Report* | |
| *Sample of report:* | |
| *Query to build Report* ***SELECT***  ***v.vendor\_id,***  ***CONCAT(v.first\_name, ' ', v.last\_name) AS vendor\_name,***  ***e.eq\_name AS equipment\_type,***  ***COUNT(re.rental\_id) AS rental\_count,***  ***SUM(re.rental\_cost) AS total\_rental\_income,***  ***AVG(DATEDIFF(re.rental\_end\_date, re.rental\_start\_date)) AS avg\_rental\_duration,***  ***MIN(re.rental\_cost / DATEDIFF(re.rental\_end\_date, re.rental\_start\_date)) AS min\_daily\_rate,***  ***MAX(re.rental\_cost / DATEDIFF(re.rental\_end\_date, re.rental\_start\_date)) AS max\_daily\_rate,***  ***AVG(re.rental\_cost / DATEDIFF(re.rental\_end\_date, re.rental\_start\_date)) AS avg\_daily\_rate***  ***FROM***  ***vendor\_profile v***  ***JOIN***  ***rented\_equipment re ON v.vendor\_id = re.vendor\_id***  ***JOIN***  ***equipments e ON re.eq\_id = e.eq\_id***  ***WHERE***  ***re.rental\_start\_date BETWEEN DATE\_SUB(CURDATE(), INTERVAL 1 YEAR) AND CURDATE()***  ***GROUP BY***  ***v.vendor\_id, e.eq\_id***  ***ORDER BY***  ***total\_rental\_income DESC;*** | |

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| ***Business Report-5*** |  |
| *Business Report Name: profit Report* | |
| *Sample of report:* | |
| *Query to build Report*: ***SELECT***  ***fp.farmer\_id,***  ***CONCAT(fp.first\_name, ' ', fp.last\_name) AS farmer\_name,***  ***SUM(cb.quantity \* cb.price) AS total\_income,***  ***SUM(wu.total\_cost) AS total\_water\_cost,***  ***SUM(re.rental\_cost) AS total\_equipment\_rental,***  ***SUM(ab.price\_per\_unit \* au.used\_quantity) AS total\_agri\_cost,***  ***SUM(cb.quantity \* cb.price)***  ***- SUM(wu.total\_cost)***  ***- SUM(re.rental\_cost)***  ***- SUM(ab.price\_per\_unit \* au.used\_quantity) AS net\_profit***  ***FROM farmer\_profile fp***  ***LEFT JOIN planted\_crops pc ON fp.farmer\_id = pc.farmer\_id***  ***LEFT JOIN water\_usage wu ON wu.planted\_id = pc.p\_id***  ***LEFT JOIN rented\_equipment re ON re.farmer\_id = fp.farmer\_id***  ***LEFT JOIN agri\_usage au ON au.planting\_id = pc.p\_id***  ***LEFT JOIN agri\_products ap ON ap.agr\_id = au.agr\_id***  ***LEFT JOIN agri\_batch ab ON ab.batch\_id = ap.batch\_id***  ***LEFT JOIN crop\_batch cb ON cb.purpose = 'Sold'***  ***LEFT JOIN crop\_stock cs ON cs.crop\_batch\_id = cb.batch\_id***  ***GROUP BY***  ***fp.farmer\_id, fp.first\_name, fp.last\_name;*** | |