BASAVARAJESWARI GROUP OF INSTITUTIONS

BALLARI INSTITUTE OF TECHNOLOGY & MANAGEMENT

Autonomous Institute under VTU, Belagavi | Approved by AICTE,New Delhi Recognized by Govt. of Karnataka

NACC Accredited Institution*
(Recognized by Govt. of Karnataka, approved by AICTE, New Delhi & Affiliated to Visvesvaraya Technological University, Belgavi)
"JnanaGangotri" Campus, No.873/2, Ballari-Hospet Road, Allipur, Ballar1-583 104 (Karnataka) (India)
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DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

A Mini Project Report On

"Data Visualization Dashboard For College Placement Data"

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Under the Guidance of

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Dept of CSE
BITM, Ballari.

Visvesvaraya Technological University

Belagavi, Karnataka

2024-2025

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CERTIFICATE

This is to certify that the project work entitled "Data Visualization Dashboard For College Placement Data" is a Bonafide work carried out by **C Harindra USN:3BR23CS404** in partial fulfilment for the award of degree of **Bachelor Degree in Computer Science & Engineering** in the VISVESVARAYA TECHNOLOGICAL UNIVERSITY, Belagavi during the academic year
2024-2025. It is certified that all corrections and suggestions indicated for internal assessment have been incorporated in the report deposited in the library. The project has been approved as it satisfies the academic requirements in respect of mini project work prescribed for a Bachelor of Engineering Degree.

Signature of project guide
Prof. Usman K

Signature of Coordinator
Prof. Md. Shafiulla

Signature of HOD
Dr R. N Kulkarni

Abstract

In educational institutions has led to the need for efficient tools to analyze and visualize data. This project focuses on developing an interactive and intuitive dashboard using Power BI to manage and analyze college placement data. The dashboard will provide a comprehensive view of placement statistics, including student performance, company participation, placement trends, and job offers across various departments. The system will incorporate an admin-only login to ensure secure access to the dashboard. Key features include real-time updates, data filtering by criteria such as department, year, and company, and visual representation through charts, graphs, and KPIs. The dashboard aims to streamline placement-related decision-making for administrators, identify improvement areas, and enhance the overall placement strategy.

Acknowledgement

The satisfaction that we feel at the successful completion of Mini project, it would be incomplete if we did not mention the names of people, whose noble gesture, affection, guidance, encouragement and support crowned my efforts with success. I express my deep sense of gratitude to the Management of Ballari Institute of Technology and Management, Ballari, for providing me the congenial environment in the college. I am deeply indebted to Prof. Usman K, Asst Professor project guide and Project Coordinator Mr. Md. Shafiulla, for consistently providing with the required guidance which helped me in the timely and successful completion of this project. In spite of his extremely busy schedules in Department, he was always available to share with me his deep insights, wide knowledge and extensive experience. I express my deep sense of gratitude to Dr . Yadavalli Basavaraj, Principal, Ballari Institute of Technology and Management, Ballari , for providing me the congenial environment in the college. I am thankful to Dr . R. N. Kulkarni , Head of the Department, Computer Science and Engineering, for providing the facilities in the Department to do this Mini project work. I extended sincere thanks to all the teaching and non-teaching staff members of, Computer Science and Engineering Department of BITM, Ballari for constant support and help during the project work.

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CHAPTER 1

Introduction

1.1 Introduction to Project

A Power BI dashboard for college placement data is a helpful tool that uses visuals to show how well a college places its students in jobs. It takes information about student placements, like the number of students placed, their salaries, and the companies they work for, and turns it into easy-to-understand charts and graphs.

This helps people who work at the college, like administrators and placement officers, see important trends and make better decisions about how to improve student job placement. For example, the dashboard might show which companies hire the most students, what the average salary is for different majors, or how placement rates have changed over time.

By using this dashboard, colleges can understand their placement performance better and find ways to help more students find good jobs after they graduate.

1.2 Problem Statement

To develop and design data is needed to centralize information, enable interactive analysis, and provide real-time, intuitive insights to enhance placement outcomes and stakeholder engagement.

1.3 Objectives

1. To Integrate all placement-related data into a single, easily accessible platform to improve organization and reduce reliance on disparate systems.
2. To Offer up-to-date visualizations of key metrics like placement rates, salary distributions, and recruiter performance, enabling timely decision-making.
3. To Allow users to filter data by department, year, job role, or recruiter, facilitating in-depth analysis and identifying trends or areas of improvement.
4. To Visualize historical placement data to identify patterns, forecast future trends, and support continuous improvement strategies.
5. To Provide actionable insights to help placement officers, faculty, and administrators optimize placement strategies and improve outcomes for students.

1.4 Scope 0f The Project

To understand the key metrics like total placements, average salaries, and sector-wise distribution, enabling stakeholders provides to analyze trends effectively.

1.5 Literature Survey

SLNO	Title	Author(s)	Year	Key Findings	Relevance to Placement Dashboard
1.	Interactive Dashboards for Educational Institutions	Dinesh k. Sharma	2019	Highlights the importance of interactivity in visual dashboards	Encourages the inclusion of slicers, filters, and drill-throughs
2.	Predictive Analytics in Student Placement	E. Rajesh	2020	Explores predictive models for student placement success	Relevant for adding prediction charts in the dashboard
3.	Data Visualization Techniques for Higher Education Analytics	Teodoro F. Revano	2021	Discusses the use of Power BI for visualizing student data effectively	Provides insights into how to structure data for placement dashboards
4.	Challenges in Visualizing Large Educational Datasets	Alessandro Febretti	2022	Addresses common challenges and solutions for handling large datasets in Power BI	Guides in optimizing performance for large placement datasets
5.	Web Integration of Power BI Dashboards	M Sukitha	2024	Examines methods to embed Power BI dashboards in websites	Examines methods to embed Power BI dashboards in websites

1.5 Literature Survey Table

Chapter 2

SYSTEM ANALYSIS

System analysis involves studying and understanding the requirements, functionality, and design of the " Data Visualization Dashboard for College Placement Data " to ensure its effectiveness and reliability in achieving the desired objectives. This section outlines the problem statement, feasibility analysis, system requirements, and overall system architecture.

2.1 Existing Systems

1. **Manual Data Management Spreadsheet-Based Tracking:** Placement data is typically managed in spreadsheets (e.g., Excel). Challenges: Data entry errors. Difficult to analyze large datasets. Lack of automation for reporting and visualization.
2. **Time-Consuming Processes:** Generating insights and reports for stakeholders (students, faculty, or recruiters) is labor-intensive. High dependency on manual work leads to inefficiencies in decision-making.
3. **Lack of Centralization: Placement data is scattered across multiple files or departments. Challenges:** No unified platform for all stakeholders. Redundant data duplication and inconsistencies.
4. **Poor Accessibility:** Reports and data are not easily accessible to all stakeholders, like students or recruiters. Limited mobile or web-based access for on-the-go updates.

2.2 Proposed Systems

A centralized placement data management system serves as a unified platform to store and access all placement-related information, including student details (e.g., branch and academic performance), company participation records, offer details (e.g., CTC and job roles), and year-wise and department-wise placement statistics. It features interactive data visualization tools like dynamic charts, graphs, with filters for year, branch, and company, along with drill-down capabilities for detailed insights and real-time updates. Additionally, real-time analytics help track key metrics such as placement rates, top recruiters, salary trends, and student participation and offer conversion rates, providing a comprehensive and intuitive solution for placement tracking and analysis.

Chapter 3

System Design

The development and operation of the " Data Visualization Dashboard for College Placement Data " require a set of hardware and software resources to ensure its functionality and efficiency. These requirements are categorized into hardware, software, and environmental specifications.

3.1 Functional Requirements

1. **Data Input**
   - Data Upload: Allow administrators to upload placement data from CSV, Excel, or database integration.
2. **Data Processing**
   - Data Validation: Automatically check for missing or incorrect data during upload or input.
   - Data Aggregation: Calculate placement statistics such as total offers, highest/average salary, and placement rate.
3. **Data Transformation**
   - Convert raw data into structured formats for visualization (e.g.CSV file).
4. **Data Visualization Features**
   - Dynamic Charts and Graphs: Year-wise placement trends. Branch-wise placement statistics.
   - Interactive Dashboards: Allow users to interact with data using filters and drill-down options (e.g., filter by year, branch, or company).

3.2 Non – Functional Requirements

1. **Performance:** The dashboard should load data and render visualizations within 3-5 seconds for datasets up to 1 million records.
2. **Scalability:** The system should be scalable to handle increasing amounts of data, including future placement years and additional metrics.
3. **Usability:** The dashboard must have an intuitive and user-friendly interface suitable for users with minimal technical knowledge.
4. **Availability:** The system should have an uptime of at least 99.9%, ensuring availability during critical placement periods.
5. **Security:** Implement role-based authentication and authorization to restrict access to sensitive data

3.3 Software Requirements

1. Power BI Desktop Version 2.138.1452.0
2. Data Source Integration
3. Power Query
4. Power BI Service
5. Power BI Mobile version 33.0

3.4 Hardware Requirements

1. **CPU:** A modern computer with a processor speed over 3 GHz is usually sufficient. However, if you're working with large datasets, you might want to consider a CPU with 8 or more cores.
2. **Power BI Report Server:** A minimum of 1 GB of memory and a 1.4 GHz x64 processor. However, 4 GB or more of memory and a 2.0 GHz or faster processor is recommended.
3. **Power BI gateway:** A virtual machine with at least 8 CPU cores and 8 GB of RAM

Chapter 4

4.1 Methodology

1. **Understand Requirements**
   - Stakeholders: Define the stakeholders (admin, placement team, etc.) and their expectations.
   - Objective: Determine key metrics such as the number of placements, placement rate, highest package, average package, top recruiters, etc.
   - Data Sources: Identify the data sources (e.g., Excel sheets, databases, online portals).

2. **Data Collection**

Gather data from relevant sources such as:
   - Student Details: Name, department, year, CGPA, etc.
   - Company Details: Company name, industry, offered roles, etc.
   - Placement Details: Package, offer date, status (placed/not placed), etc.
   - Ensure the data is clean and updated.

3. **Data Preparation**
   - Clean the Data: Handle missing, duplicate, or incorrect data using Power Query or external tools.
   - Transform Data: Normalize tables (e.g., students, companies, and placement records).
   - Create relationships between tables (e.g., student ID linked with placement records).
   - Load Data into Power BI: Import the cleaned data.

4. **Create Key Metrics**
   - Use DAX (Data Analysis Expressions) to calculate metrics like:
   - Placement Rate = (Placed Students / Total Students) * 100
   - Average Package = SUM(Package) / COUNT (Placed Students)
   - Top Recruiting Companies = COUNT (Offers by Company)

5. **Design the Dashboard**
   - Layout: Place KPIs (Key Performance Indicators) at the top.
   - Add charts and visuals for trends (e.g., placement trends by year, department, or company).
   - Visuals to Include: Column Chart: Number of placements by department or company.
   - Pie Chart: Placement distribution across industries.

- Line Chart: Trends in placement rates over time.
- Table/Matrix: Detailed placement records.

6. **Add Interactivity**
   - Use slicers and filters for users to explore data (e.g., filter by department, year, or company).
   - Enable drill-through features to navigate detailed views.

7. **Review and Validate**
   - Cross-check all visuals and metrics for accuracy.
   - Ensure the dashboard meets the stakeholders' requirements.
   - Get feedback from stakeholders and iterate.

8. **Publish and Share**
   - Publish to Power BI Service: Make the dashboard accessible online.
   - Configure Access: Use role-level security (RLS) to restrict access to admin users.
   - Embed in Website: Generate an embed link or integrate using Power BI API to host the dashboard on a website.

9. **Maintenance**
   - updating the data.
   - Monitor performance and refine visuals or calculations as needed.

Chapter 5

Design

5.1 Sequence Diagram

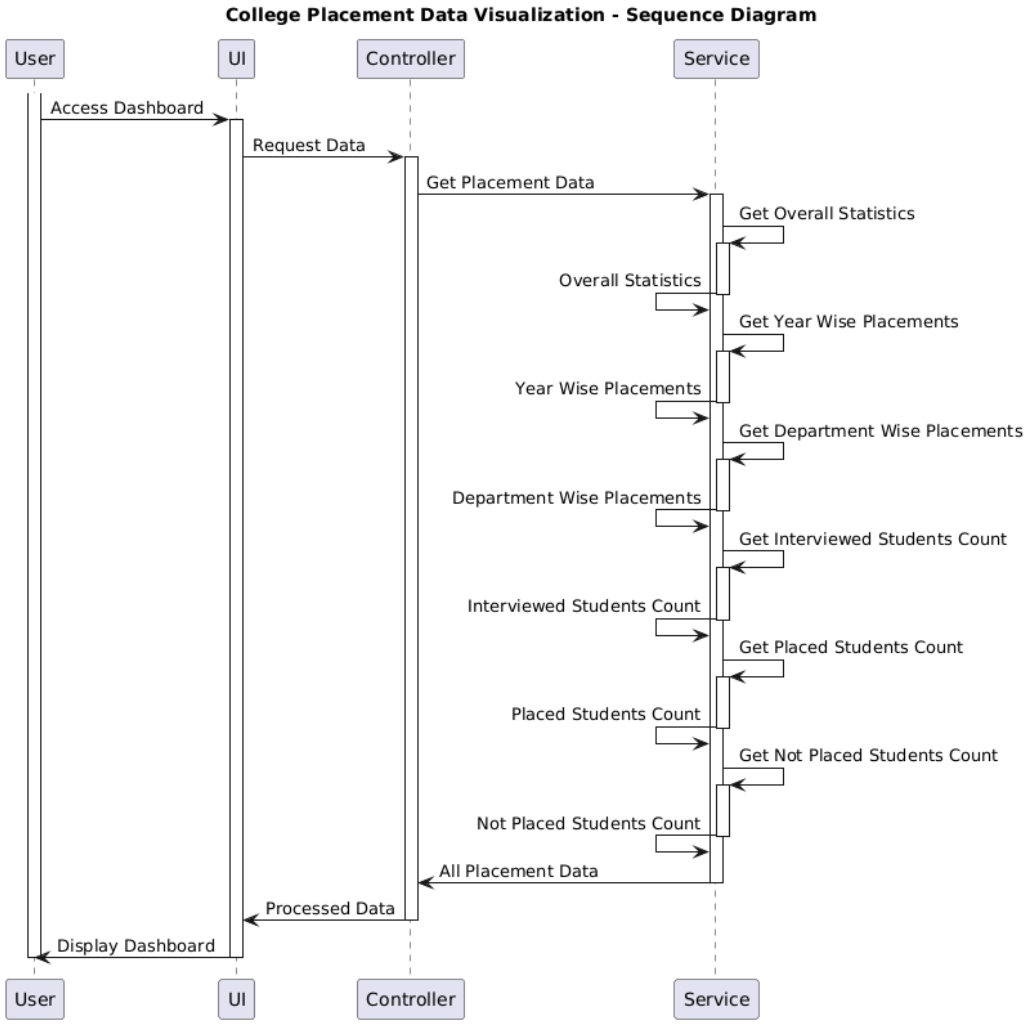


Fig: 5.1 Sequence Diagram

Overview

This Sequence Diagram illustrates the interaction between different components (User, UI, Controller, and Service) involved in accessing and displaying placement data within a college placement data visualization dashboard. It depicts the sequence of messages exchanged between these components to fulfil a user's request to access the dashboard.

Key Elements

- **User:** The initiator of the interaction. The **input** starts here with the user accessing the dashboard.
- **UI (User Interface):** The visual representation of the dashboard that the user interacts with.
- **Controller:** The intermediary component that handles user requests and coordinates with the Service layer.
- **Service:** The layer responsible for fetching and processing the actual placement data from the database or data source.

Sequence of Events:

1. **User Accesses Dashboard:** The user initiates the interaction by accessing the dashboard through the UI.

2. **UI Requests Data:** The UI sends a request to the Controller, asking for the placement data.

3. **Controller Gets Placement Data:** The Controller receives the request and forwards it to the Service layer.

4. **Service Fetches and Processes Data:** The Service layer interacts with the database or data source to retrieve the raw placement data. It then processes the data by:
    - Calculating Overall Statistics (e.g., total placements, placement rate)
    - Extracting Year-Wise Placements
    - Extracting Department-Wise Placements
    - Counting Interviewed Students
    - Counting Placed Students
    - Counting Not Placed Students

5. **Service Returns Processed Data:** The Service layer sends the processed data back to the Controller.

6. **Controller Sends Processed Data to UI:** The Controller receives the processed data from the Service and passes it to the UI.

7. **UI Displays Dashboard:** The UI receives the processed data and uses it to generate and display the dashboard visualizations, such as charts, graphs, and tables.

5.2 Use Case Diagram

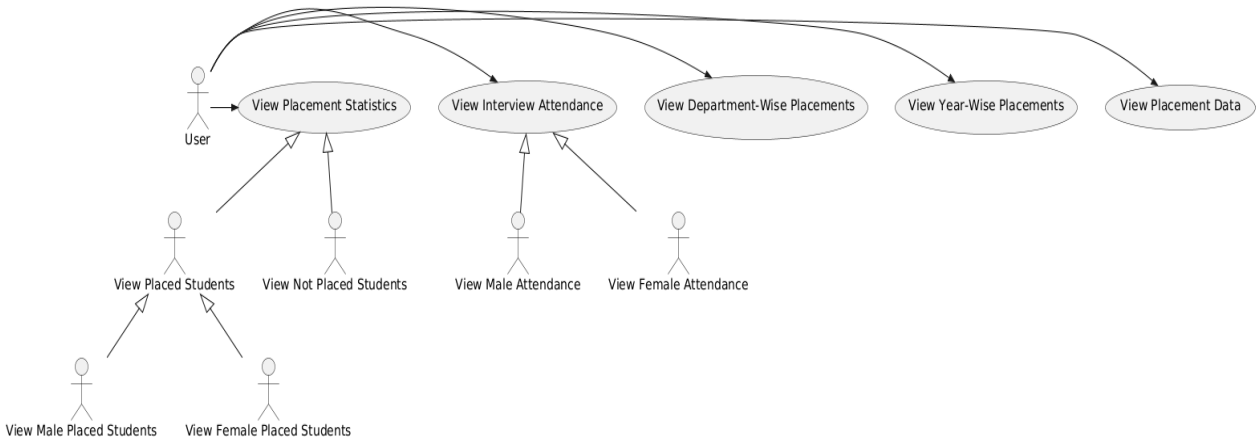


Fig 5.2 Use Case Diagram

- User: The central actor in the diagram, representing the end-user who interacts with the dashboard. This is the input source for the system.
- Use Cases: These are the various functionalities offered by the dashboard, represented by ovals.

1. **View Placement Statistics:**
   - Input: User initiates this use case.
   - Output: The dashboard displays overall placement data, such as the total number of placed students, placement rate, and average salary, often in the form of charts, graphs, or tables.

2. **View Interview Attendance:**
   - Input: User initiates this use case.
   - Output: The dashboard displays data on interview attendance, including the number of students who attended interviews and the interview success rate, typically visualized through charts or graphs.

3. **View Department-Wise Placements:**
   - Input: User initiates this use case.
   - Output: The dashboard presents placement data organized by department, allowing comparisons of placement rates and other metrics across departments, often visualized using bar charts or tables.

4. **View Year-Wise Placements:**
    - Input: User initiates this use case.
    - Output: The dashboard displays placement trends over time, visualizing placement data year-by-year, typically using line charts or bar charts.

5. **View Placement Data:**
    - Input: User initiates this use case.
    - Output: The dashboard displays detailed placement data for individual students, including their placement status, company, and salary, often presented in tabular format or detailed student profiles.

6. **Sub-use Cases: These further refine the analysis:**
    - View Placed Students:
        - Input: User initiates this sub-use case.
        - Output: The dashboard displays data specifically related to placed students.
    - View Not Placed Students:
        - Input: User initiates this sub-use case.
        - Output: The dashboard displays data specifically related to students who haven't secured placements.
    - View Male Attendance:
        - Input: User initiates this sub-use case.
        - Output: The dashboard displays data specifically related to male student interview attendance.
    - View Female Attendance:
        - Input: User initiates this sub-use case.
        - Output: The dashboard displays data specifically related to female student interview attendance.
    - View Male Placed Students:
        - Input: User initiates this sub-use case.
        - Output: The dashboard displays data specifically related to placed male students.
    - View Female Placed Students:
        - Input: User initiates this sub-use case.
        - Output: The dashboard displays data specifically related to placed female students.

5.3 Activity Diagram

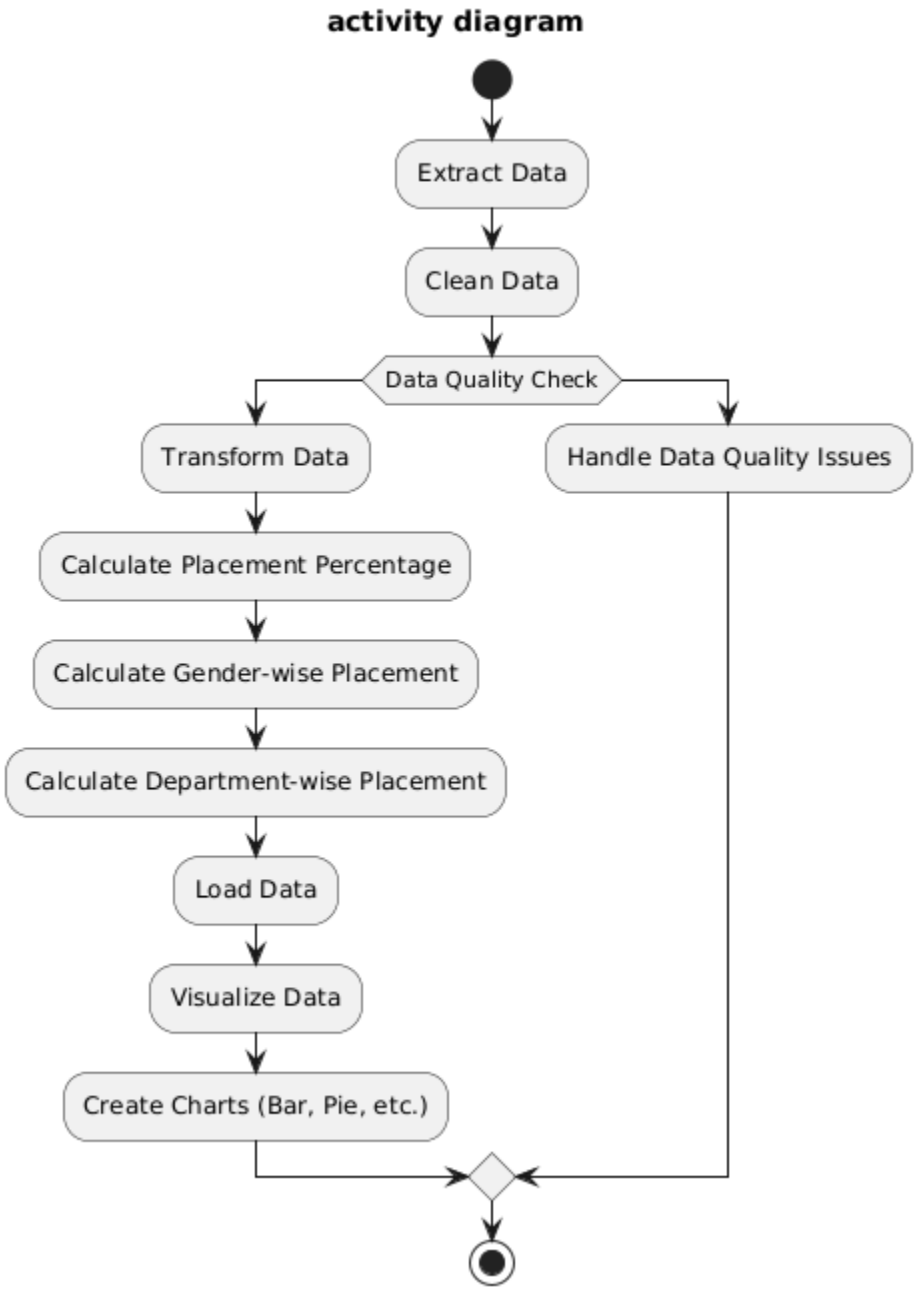


Fig 5.3 Activity Diagram

1. **Data Collection:** The process starts by gathering raw placement data from various sources.
2. **Data Cleaning:** The data is cleaned to remove errors, inconsistencies, and missing values.

3. **Data Quality Check:** The cleaned data is reviewed for accuracy and completeness. Any issues found are addressed.
4. **Data Transformation:** The data is transformed into a suitable format for analysis, which might involve calculations and aggregations.

5. **Analysis:**
   - The overall placement percentage is calculated.
   - The placement percentage is calculated separately for male and female students.
   - The placement percentage is calculated for each department.

6. **Data Loading:** The processed data is loaded into a storage system for future use.

7. **Data Visualization:** The data is visualized using charts and graphs (bar charts, pie charts, etc.) to make it easier to understand and interpret.

Chapter 6

Implementation

1. Data Preparation

- Gather Data:
    - Collect all relevant placement data, including student demographics, academic records, extracurricular activities, and placement details (company, role, salary, etc.).
- Data Cleaning:
    - Handle Missing Values: Impute missing values using appropriate methods (e.g., mean, median, mode) or remove rows/columns with excessive missing data.
- Data Transformation:
    - Format Data: Ensure consistent data formats (e.g., dates, numbers).
    - Create Calculated Columns: Derive new columns (e.g., GPA range, salary bands).
    - Data Type Conversion: Convert data types to appropriate formats (e.g., text to category).
- Data Integration:
    - Combine data from different sources (e.g., student database, placement records) into a single dataset.

2. **Connect to Power BI**

- Import Data:
    - Import: Bring the entire dataset into Power BI memory. Suitable for smaller datasets.
    - Direct Query: Query the data source directly. Recommended for large datasets to optimize performance.
- Data Model:
    - Create Relationships: Define relationships between tables (e.g., students, placements, companies).
    - Create Measures: Define custom calculations (e.g., placement rate, average salary, top recruiters).

3. Build Visualizations

- Choose Visuals: Select appropriate chart types based on the data and the insights you want to convey:
    - Bar Charts: Compare placement rates across departments, companies, or student groups.
    - Line Charts: Track placement trends over time (e.g., year-over-year placement rates).
    - Pie Charts: Show the proportion of placements in different sectors or job roles.
    - Scatter Plots: Explore relationships between variables (e.g., GPA vs. salary).
    - Tree maps: Visualize hierarchical data (e.g., placements by company and department).
    - Maps: Show geographic distribution of placements (if applicable).
- Create Visuals: Drag and drop fields from the Fields pane onto the canvas to create visualizations.
- Format Visuals: Customize the appearance of visuals (e.g., colors, labels, legends) for better clarity and aesthetics.

4. **Create Dashboards**

- Arrange Visuals: Arrange visualizations on a dashboard to tell a cohesive story about placement data.
- Add Filters and Slicers: Enable interactive filtering to allow users to explore different segments of the data.
- Add Text Boxes and Images: Enhance the visual appeal and provide context to the visualizations.

5. **Publish and Share**

- Publish to Power BI Service: Publish the report to the Power BI service to share it with others or embed it in a website or application.
- Share with Stakeholders: Share the report with relevant stakeholders (e.g., placement officers, faculty, students).

Chapter 7

Testing

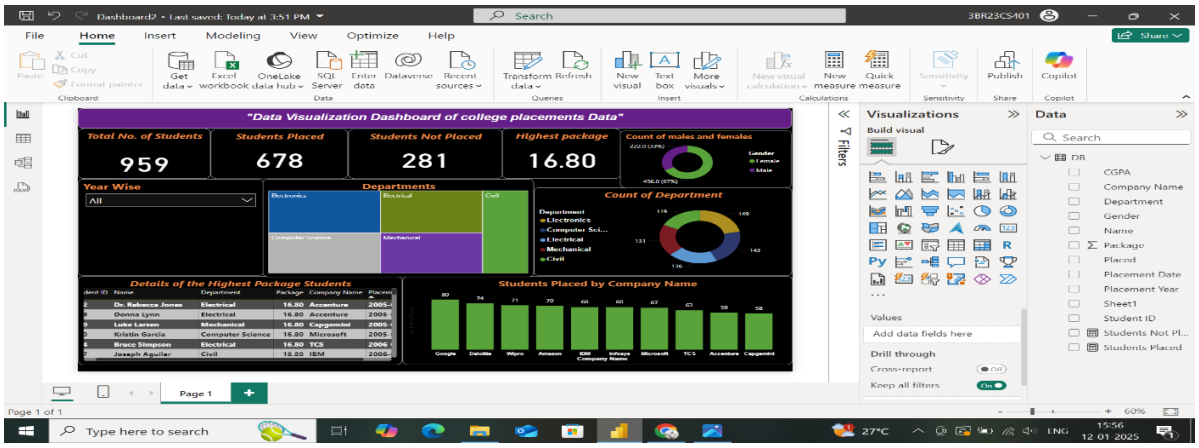
7.1 Unit Testing

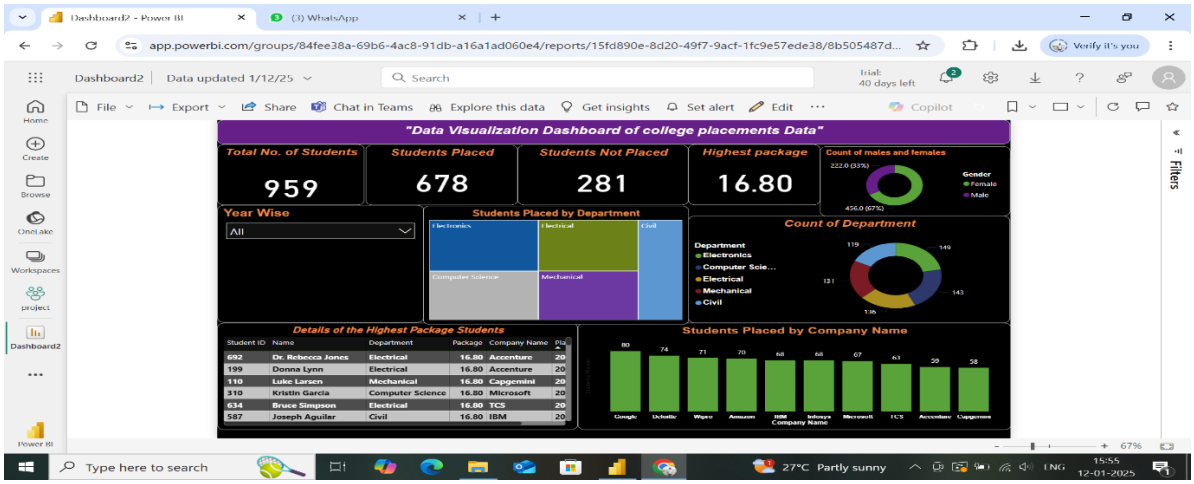
Test Case	Test Scenario	Input	Expected Output
TC01	**Data Accuracy**	Verify data source for student academic records.	Data source is accurate and up-to-date.
TC02	**Data Accuracy**	Verify data source for placement data.	Data source is accurate and up-to-date.
TC03	**Data Transformation**	Check for data type conversions (e.g., text to number).	Data types are correctly converted.
TC04	**Visualization Accuracy**	Verify average salary calculation.	Calculated average salary matches expected value.
TC05	**Visualization Accuracy**	Verify placement trends over time.	Line graph accurately displays placement trends over time.
TC06	**Visualization Accuracy**	Verify student satisfaction with placement process.	Pie chart accurately displays student satisfaction percentages.
TC07	**Filtering**	Filter data by department.	Dashboard filters data correctly by selected department.
TC08	**Sorting**	Sorts data by placement data.	Dashboard sorts data by placement rate in ascending/descending order as selected.
TC09	**Usability**	Observe users interacting with the dashboard.	Users can easily navigate and interact with the dashboard.

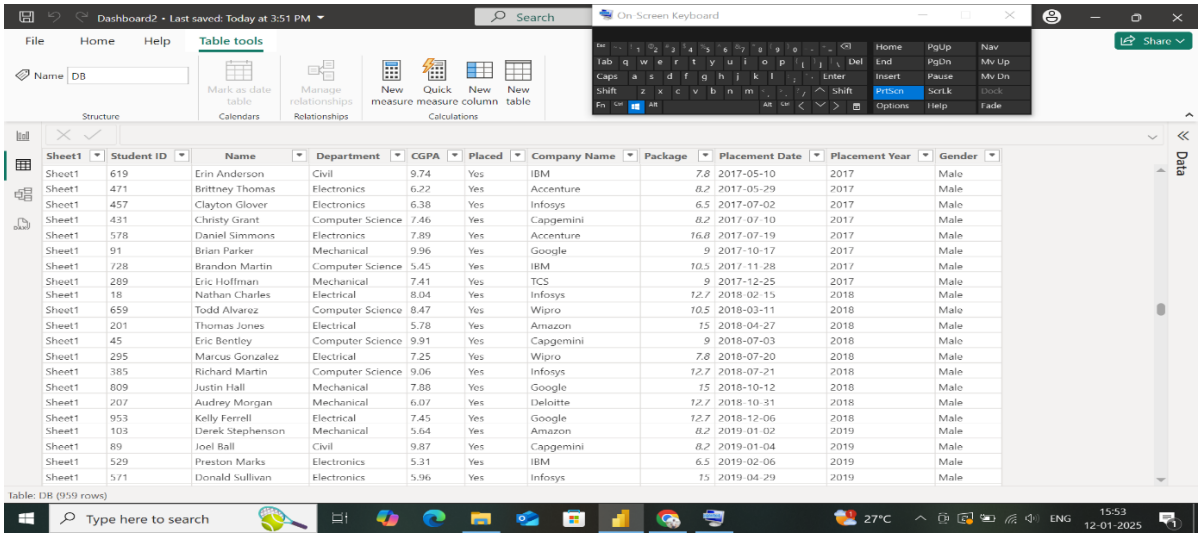
Fig 7.1 Test Cases with scenarios, Input, Expected Output

Chapter 8

8.1 Results(snapshots)







Sheet1	Student ID	Name	Department	CGPA	Placed	Company Name	Package	Placement Date	Placement Year	Gender
Sheet1	619	Erin Anderson	Civil	9.74	Yes	IBM	7.8	2017-05-10	2017	Male
Sheet1	471	Brittney Thomas	Electronics	6.22	Yes	Accenture	8.2	2017-05-29	2017	Male
Sheet1	457	Clayton Glover	Electronics	6.38	Yes	Infosys	6.5	2017-07-02	2017	Male
Sheet1	431	Christy Grant	Computer Science	7.46	Yes	Capgemini	8.2	2017-07-10	2017	Male
Sheet1	578	Daniel Simmons	Electronics	7.89	Yes	Accenture	16.8	2017-07-19	2017	Male
Sheet1	91	Brian Parker	Mechanical	9.96	Yes	Google	9	2017-10-17	2017	Male
Sheet1	728	Brandon Martin	Computer Science	5.45	Yes	IBM	10.5	2017-11-28	2017	Male
Sheet1	289	Eric Hoffman	Mechanical	7.41	Yes	TCS	9	2017-12-25	2017	Male
Sheet1	18	Nathan Charles	Electrical	8.04	Yes	Infosys	12.7	2018-02-15	2018	Male
Sheet1	659	Todd Alvarez	Computer Science	8.47	Yes	Wipro	10.5	2018-03-11	2018	Male
Sheet1	201	Thomas Jones	Electrical	5.78	Yes	Amazon	15	2018-04-27	2018	Male
Sheet1	45	Eric Bentley	Computer Science	9.91	Yes	Capgemini	9	2018-07-03	2018	Male
Sheet1	295	Marcus Gonzalez	Electrical	7.25	Yes	Wipro	7.8	2018-07-20	2018	Male
Sheet1	385	Richard Martin	Computer Science	9.06	Yes	Infosys	12.7	2018-07-21	2018	Male
Sheet1	809	Justin Hall	Mechanical	7.88	Yes	Google	15	2018-10-12	2018	Male
Sheet1	207	Audrey Morgan	Mechanical	6.07	Yes	Deloitte	12.7	2018-10-31	2018	Male
Sheet1	953	Kelly Ferrell	Electrical	7.45	Yes	Google	12.7	2018-12-06	2018	Male
Sheet1	103	Derek Stephenson	Mechanical	5.64	Yes	Amazon	8.2	2019-01-02	2019	Male
Sheet1	89	Joel Ball	Civil	9.87	Yes	Capgemini	8.2	2019-01-04	2019	Male
Sheet1	529	Preston Marks	Electronics	5.31	Yes	IBM	6.5	2019-02-06	2019	Male
Sheet1	571	Donald Sullivan	Electronics	5.96	Yes	Infosys	15	2019-04-29	2019	Male

Conclusion

Awell-designed data visualization dashboard for college placement data can provide invaluable insights into student career outcomes. By analyzing trends in placement rates, identifying top recruiters and their hiring preferences, and examining the factors that influence student success, institutions can make data-driven decisions to improve career services, enhance curriculum, and ultimately increase student employability. The dashboard can reveal areas of strength and weakness, identify departments with high placement rates, and highlight areas for targeted interventions to support students. Moreover, it can help track the effectiveness of existing initiatives and measure the impact of improvements over time. Ultimately, a data-driven approach to placement analysis empowers colleges to better serve their students and ensure their successful transition into the professional world.

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