Hospital Management System

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Introduction

The goal of the Hospital Management SQL Project is to completely transform how our organization handles patient data. This project aims to maximize hospital operations and patient care by rethinking the way information is stored, accessed, and used in an increasingly data-centric world. A complex database structure must be carefully designed and implemented to achieve this goal. It includes linking tables for patients, employees, departments and other relevant information. Establishing a solid relational database structure that meets present requirements and is expandable for future expansion is the aim. The project demonstrates working with SQL databases like `MySQL`, and data warehouses like `AWS RDS'.

One of the most important skills for data analysis is interacting with databases. The database is split into separate tables which represent different logical objects. For example, all the patients are in the patient's database. Each table has a set of fields, which define the attributes of the table, and rows, which store the actual data. Relationships between tables are represented by special fields called foreign keys. The logical diagram of the project which is mainly the Entity-Relationship Diagram as well as the Relational Diagram is depicted in the report.

Once the database in created, we have used DDL statements to create Tables and we have inserted dummy data into the respective tables. Finally, we have prepared a set of analytic questions to test the database using SQL statements.

We have then deployed the database on AWS and then prepared a Dashboard for the same.

Advantages of Hospital Management System

Numerous benefits of a hospital management system (HMS) have a substantial impact on the effectiveness, standard of care, and general administration of healthcare institutions. These benefits include:

1. **Streamlined Operations**: Administrative procedures are made more efficient by combining scheduling, billing, inventory control, and patient information into a single system. This lowers data input mistakes, decreases paperwork, and increases workflow efficiency.
2. **Improved Patient Care**: Healthcare professionals may act quickly and decisively when they have fast access to thorough patient records. In the end, it improves patient outcomes by enabling prompt therapies, precise diagnoses, and improved staff collaboration.
3. **Enhanced Collaboration and Communication**: Health care teams may communicate more effectively because to HMS. The seamless sharing of patient data, treatment plans, and updates among physicians, nurses, and administrative personnel promotes teamwork and guarantees continuity of care.
4. **Effective Scheduling**: Automated scheduling of appointments lowers no-shows, maximizes the use of resources, and cuts down on wait times. By lowering administrative overhead and providing flexible scheduling alternatives, it improves patient satisfaction.
5. **Precise Billing and Financial Administration**: Integrated billing modules provide the efficient generation of precise invoices, the management of insurance claims, and the tracking of payments. This guarantees adherence to regulatory requirements, enhances revenue cycles, and lowers billing mistakes.

6. **Inventory and Resource Management**: There is an increase in the efficiency of keeping an eye on and managing hospital inventory, which includes supplies, equipment, and drugs. It minimizes waste, helps avoid stockouts, and guarantees the timely availability of necessary resources.
7. **Data Security and Confidentiality**: HMS systems protect sensitive patient data by enforcing strict data security protocols. Regulation adherence to privacy laws and data confidentiality are guaranteed by access restrictions, encryption, and audit trails.
8. **Analytics and Decision Support**: HMS's sophisticated reporting and analytics features offer insights into hospital operations, patterns, and performance indicators. This supports efforts for quality improvement, resource allocation, and strategic planning.
9. **Integration of Telemedicine and Remote Access**: Certain HMS systems provide remote access, allowing medical personnel to safely access patient information from any location. Patients' access to and convenience with healthcare is increased by integration with telemedicine services.
10. **Compliance and Adherence to Regulations**: HMS systems are made to abide with industry standards and laws, including the Health Insurance Portability and Accountability Act (HIPAA) and other local healthcare laws. By doing this, possible fines are avoided, and legal compliance is ensured.

All things considered, a well-executed hospital management system maximizes operational performance, enhances patient care, protects patient data, and adds to the facility's total capacity to offer healthcare.

Use Cases of Hospital Management System

Healthcare is not the only industry using Hospital Management Systems (HMS) or related database systems. Similar management databases customized for their own requirements are advantageous to a variety of sectors and businesses:

1. **Healthcare Sector**: Similar patient management, billing, and treatment record systems are used by specialized healthcare institutions, including dentist offices, rehabilitation centers, nursing homes, and diagnostic labs, in addition to hospitals, clinics, and medical centers.
2. **Pharmaceutical Industry**: To handle medication development, production, distribution, and regulatory compliance, pharmaceutical businesses employ database systems. These systems monitor sales data, inventories, clinical trial information, and medication information.
3. **Health Insurance Providers**: To manage massive amounts of data and streamline operations, insurance firms use management systems for member enrollment, claims processing, policy administration, and invoicing.
4. **Education Sector**: To handle student records, enrollment, grades, attendance, and academic calendars, educational institutions—including schools, colleges, and universities—use student information systems.
5. **Corporate Sector**: Enterprise Resource Planning (ERP) systems, which integrate several features including supply chain, finance, HR, and customer relationship management, are frequently used by large organizations. Department-wide data management and operations are streamlined by these solutions.

6. **Retail Sector**: Point of Sale (POS) systems are used by retail establishments to collect client information, manage inventory, record sales data, and provide reports for business analytics and decision-making.
7. **Manufacturing Sector**: Manufacturing businesses use Manufacturing Execution Systems (MES) to handle quality control, keep track of inventories, supervise production procedures, and allocate resources as efficiently as possible.
8. **Travel and Hospitality**: Reservation and booking systems are used by hotels, airlines, and travel companies to handle client bookings, preferences, billing, and loyalty programs.
9. **Government Agencie**s: To manage citizen records, compliance, and service delivery, several government departments, including tax authorities, social services, and public health agencies, use management systems.
10. **Supply chain and logistics**: Logistics firms employ systems to monitor shipments, control inventories, plan the best routes, and organize warehousing and transportation activities.

In summary, management systems akin to hospital management systems that are customized to meet the unique requirements and workflows of any industry or corporation that deals with data management, customer/client/patient records, inventory, scheduling, and operational optimization might be beneficial.

Business Rules

Employee Role:

Each employee in the employee table defines a specific role by EmployeeRoleID in EmployeeRole table.

Departments:

The hospital's several departments are documented in the department table, and DepartmentId allow each department to be individually recognized.

Employee-Department:

The employee-department table defines the link between employees who work in various departments. Each entry in this table corresponds to a worker who works in a certain department.

Patient

PatientID serves as a unique identifier for each patient, and patient data is kept in the patient table.

Patient-Record

Every patient visit record, including information about the disease, room number, date of admission, date of discharge, and the related patient and staff, is kept in the patient record table.

Labtest

The labtest table contains information about all the many lab tests that the hospital does.

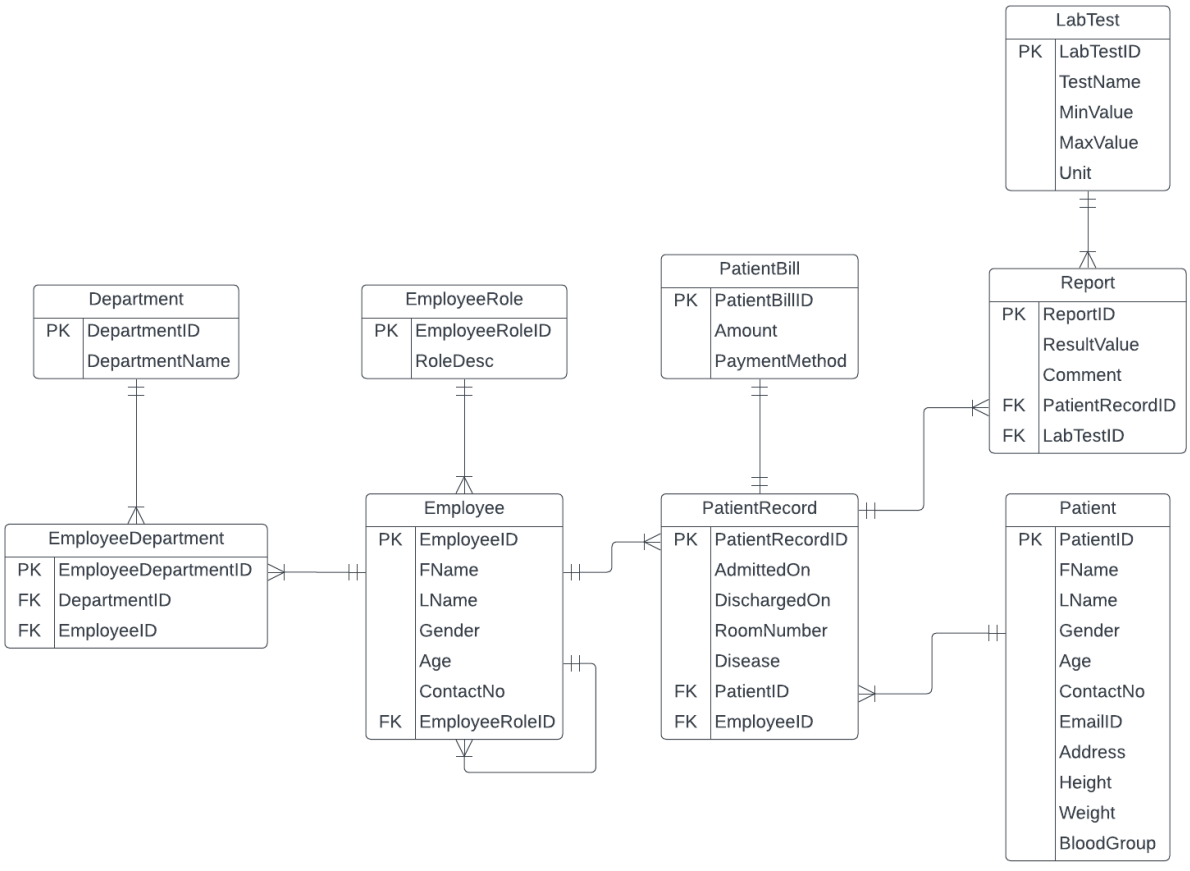
Report

The results of the lab tests are listed in the report table, and each report is linked to a particular patient record and lab test.

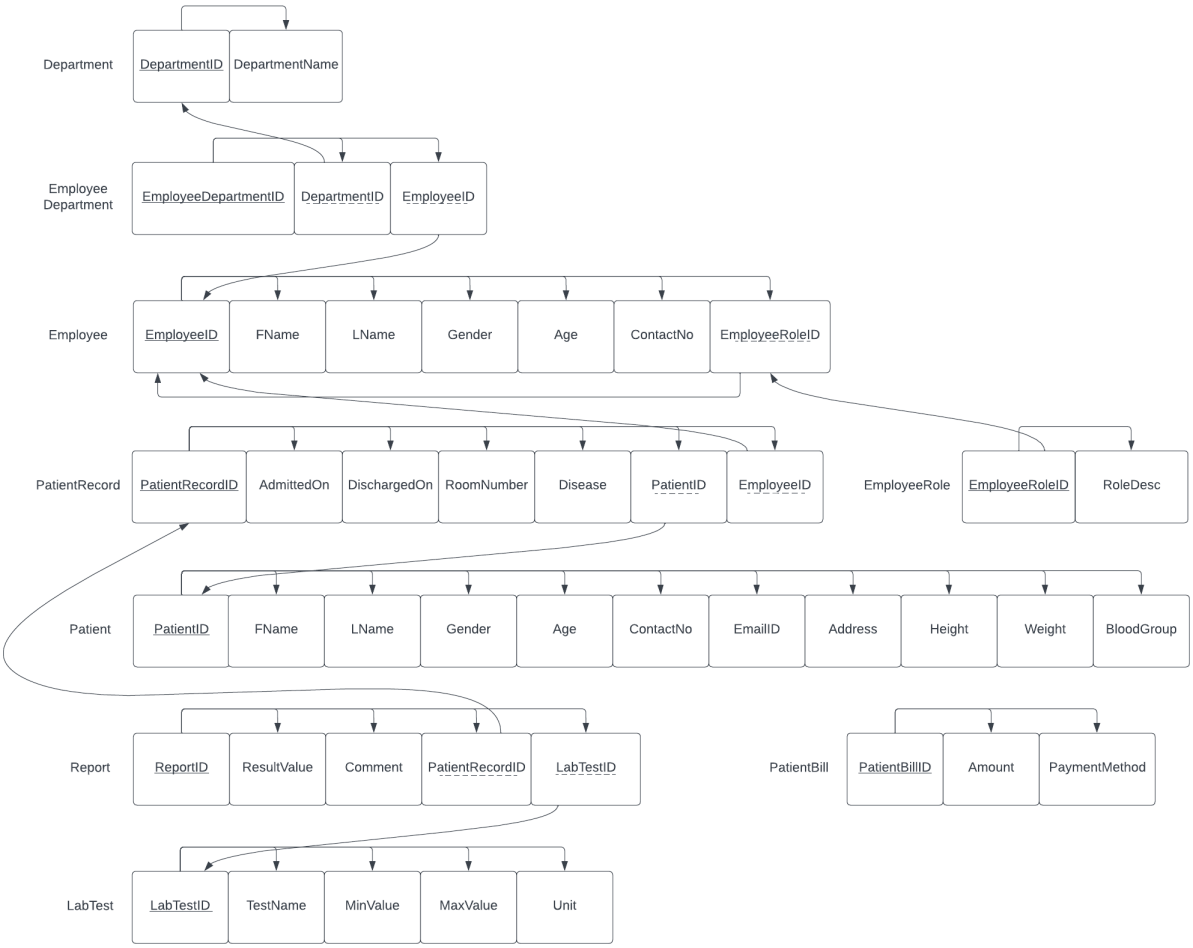
PatientBill

The patientbill table contains billing details for every patient visit, such as the total amount invoiced, the mode of payment, and the related patient record.

Entity Relationship Diagram



Relational Diagram



SQL Commands for Creating Tables into the Database

The following file contains all the SQL commands for creating tables into the Hospital Database.

(Create Tables for Hospital Management)

Department and EmployeeRole

```
CREATE TABLE `hospitaldbms`.`department` (
  `DepartmentId` INT NOT NULL,
  `DepartmentName` VARCHAR(45) NOT NULL,
  PRIMARY KEY (`DepartmentId`));

  CREATE TABLE `hospitaldbms`.`employeerole` (
  `EmpRoleID` INT NOT NULL,
  `RoleDescription` VARCHAR(45) NOT NULL,
  PRIMARY KEY (`EmpRoleID`));

```

Employee

```
CREATE TABLE `hospitaldbms`.`employee` (
  `EmployeeID` INT NOT NULL,
  `FName` VARCHAR(45) NOT NULL,
  `LName` VARCHAR(45) NULL,
  `Gender` VARCHAR(45) NULL,
  `Age` INT NOT NULL,
  `ContactNo` VARCHAR(45) NULL,
  `EmpRoleID` INT NOT NULL,
  PRIMARY KEY (`EmployeeID`),
  CONSTRAINT `fk_EmployeeRole`
    FOREIGN KEY (`EmpRoleID`)
    REFERENCES `hospitaldbms`.`employeerole`(`EmpRoleID`)
    ON DELETE CASCADE
    ON UPDATE CASCADE
);
```

EmployeeDepartment

```
27  CREATE TABLE `hospitaldbms`.`employeedepartment` (
28      EmployeeDepartmentID INT PRIMARY KEY,
29      DepartmentId INT,
30      EmployeeID INT,
31      CONSTRAINT `fk_DepartmentId`
32      FOREIGN KEY (DepartmentId) REFERENCES `hospitaldbms`.`department`(DepartmentId)
33      ON DELETE CASCADE
34      ON UPDATE CASCADE,
35      CONSTRAINT `fk_EmployeeID`
36      FOREIGN KEY (EmployeeID) REFERENCES `hospitaldbms`.`employee`(EmployeeID)
37      ON DELETE CASCADE
38      ON UPDATE CASCADE
39  );
40
```

Patient

```
41  CREATE TABLE `hospitaldbms`.`patient` (
42    `PatientID` INT NOT NULL,
43    `FName` VARCHAR(45) NOT NULL,
44    `LName` VARCHAR(45) NULL,
45    `Gender` VARCHAR(45) NOT NULL,
46    `Age` INT NOT NULL,
47    `ContactNo` VARCHAR(45) NOT NULL,
48    `EmailID` VARCHAR(45) NULL,
49    `Address` VARCHAR(45) NOT NULL,
50    `Height` VARCHAR(45) NOT NULL,
51    `Weight` VARCHAR(45) NULL,
52    `BloodGroup` VARCHAR(45) NOT NULL,
53    PRIMARY KEY (`PatientID`));
54
```

PatientRecord

```
55  CREATE TABLE `hospitaldbms`.`patientrecord` (
56    `PatientRecordID` INT NOT NULL,
57    `AdmittedOn` VARCHAR(45) NOT NULL,
58    `DischargedOn` VARCHAR(45) NOT NULL,
59    `RoomNumber` VARCHAR(45) NOT NULL,
60    `Disease` VARCHAR(45) NOT NULL,
61    `PatientID` INT NOT NULL,
62    `EmployeeID` INT NOT NULL,
63    PRIMARY KEY (`PatientRecordID`),
64    CONSTRAINT `fk_PatientID`
65      FOREIGN KEY (`PatientID`)
66      REFERENCES `hospitaldbms`.`patient` (`PatientID`)
67      ON DELETE CASCADE
68      ON UPDATE CASCADE,
69    CONSTRAINT `fk_EmployeeID1`
70      FOREIGN KEY (`EmployeeID`)
71      REFERENCES `hospitaldbms`.`employee` (`EmployeeID`)
72      ON DELETE CASCADE
73      ON UPDATE CASCADE);
74
```

LabTest and Report

```
75  CREATE TABLE `hospitaldbms`.`labtest` (
76    `LabTestID` INT NOT NULL,
77    `TestName` VARCHAR(45) NOT NULL,
78    `MinValue` FLOAT NOT NULL,
79    `MaxValues` FLOAT NOT NULL,
80    `Unit` VARCHAR(45) NOT NULL,
81    PRIMARY KEY (`LabTestID`));
82
83    CREATE TABLE `hospitaldbms`.`report` (
84    `ReportID` INT NOT NULL,
85    `ResultValue` FLOAT NOT NULL,
86    `Comment` VARCHAR(45) NOT NULL,
87    `PatientRecordID` INT NOT NULL,
88    `LabTestID` INT NOT NULL,
89    PRIMARY KEY (`ReportID`),
90    CONSTRAINT `fk_PatientRecordID`
91      FOREIGN KEY (`PatientRecordID`)
92      REFERENCES `hospitaldbms`.`patientrecord` (`PatientRecordID`)
93      ON DELETE CASCADE
94      ON UPDATE CASCADE,
95    CONSTRAINT `fk_LabTestID`
96      FOREIGN KEY (`LabTestID`)
97      REFERENCES `hospitaldbms`.`labtest` (`LabTestID`)
98      ON DELETE CASCADE
99      ON UPDATE CASCADE);
```

PatientBill

```
CREATE TABLE `hospitaldbms`.`patientbill` (
  `PatientBillID` INT NOT NULL,
  `Amount` FLOAT NOT NULL,
  `PaymentMethod` VARCHAR(45) NOT NULL,
  `PatientRecordID` INT NOT NULL,
  PRIMARY KEY (`PatientBillID`),
  CONSTRAINT `fk_PatientRecordID1`
    FOREIGN KEY (`PatientRecordID`)
    REFERENCES `hospitaldbms`.`patientrecord` (`PatientRecordID`)
    ON DELETE CASCADE
    ON UPDATE CASCADE
    );
```

SQL Commands for Inserting Tables into the Database

The following file contains all the SQL commands for inserting values into the Hospital Database. (Insert Into Hospital Management)

Analytical Questions

We have built few analytical questions which make use of the single as well as multiple tables for the Hospital Database. They are as follows:

1. How many times has a patient visited the hospital.

```
SELECT
    p.PatientID, p.FName, p.LName, p.Gender, p.Age, p.ContactNo, p.EmailID, p.Address, p.Height, p.Weight, p.BloodGroup,
    COUNT(pr.PatientRecordID) AS VisitCount
FROM
    hospitaldbms.patient p
JOIN
    hospitaldbms.patientrecord pr ON p.PatientID = pr.PatientID
GROUP BY
    p.PatientID
ORDER BY
    VisitCount DESC;
```

Result:

PatientID	FName	LName	Gender	Age	ContactNo	EmailID	Address	Height	Weight	BloodGroup	VisitCount
501	Mary	Johnson	Female	75	987-654-3210	mary.johnson@example.com	456 Senior Avenue	160 cm	65 kg	B-	2
500	John	Smith	Male	70	123-456-7890	john.smith@example.com	123 Elder Street	170 cm	75 kg	A+	2
552	George	Henderson	Male	58	444-555-6666	george.henderson@example.com	456 Oak Street	170 cm	75 kg	B-	1
537	Max	Ward	Male	72	333-444-5555	max.ward@example.com	123 Birch Avenue	175 cm	80 kg	O-	1
551	Eleanor	Baker	Female	55	111-222-3333	eleanor.baker@example.com	123 Cedar Avenue	160 cm	65 kg	A+	1
550	Emma	Garcia	Female	16	555-123-4567	emma.garcia@example.com	456 Pine Street	165 cm	72 kg	B+	1
549	Mason	Jones	Male	18	987-654-3210	mason.jones@example.com	123 Oak Lane	160 cm	78 kg	A+	1
548	Isabella	Martinez	Female	19	123-456-7890	isabella.martinez@example.com	890 Pine Circle	155 cm	70 kg	AB-	1
547	Caden	Davis	Male	17	333-444-5555	caden.davis@example.com	789 Cedar Street	175 cm	80 kg	O-	1
546	Ava	Miller	Female	18	222-333-4444	ava.miller@example.com	567 Elm Avenue	155 cm	68 kg	B+	1
545	Noah	Taylor	Male	16	666-777-8888	noah.taylor@example.com	234 Birch Circle	160 cm	75 kg	A-	1
544	Olivia	Smith	Female	17	999-888-7777	olivia.smith@example.com	101 Oak Park	165 cm	72 kg	AB+	1
543	Liam	Brown	Male	19	777-888-9999	liam.brown@example.com	789 Maple Lane	180 cm	85 kg	A+	1
542	Sophia	Johnson	Female	16	444-555-6666	sophia.johnson@example.com	456 Cedar Avenue	160 cm	55 kg	B-	1

Result 1

2. What is the total amount billed by a particular patient throughout his/her visits.

```
SELECT
    p.PatientID, p.FName, p.LName, p.Gender, p.Age, p.ContactNo, p.EmailID, p.Address, p.Height, p.Weight, p.BloodGroup,
    SUM(pb.Amount) AS TotalAmountBilled
FROM
    hospitaldbms.patientbill pb
JOIN
    hospitaldbms.patientrecord pr ON pb.PatientRecordID = pr.PatientRecordID
JOIN
    hospitaldbms.patient p ON pr.PatientID = p.PatientID
GROUP BY
    p.PatientID
ORDER BY
    TotalAmountBilled DESC;
```

Result:

PatientID	FName	LName	Gender	Age	ContactNo	EmailID	Address	Height	Weight	BloodGroup	TotalAmountBilled
500	John	Smith	Male	70	123-456-7890	john.smith@example.com	123 Elder Street	170 cm	75 kg	A+	9302.300048828125
560	Samuel	Hunter	Male	75	555-123-4567	samuel.hunter@example.com	456 Cedar Circle	165 cm	74 kg	A-	8401.300048828125
554	Henry	Simpson	Male	70	999-888-7777	henry.simpson@example.com	101 Maple Circle	180 cm	85 kg	AB+	7501.9501953125
558	Frank	Wells	Male	80	123-456-7890	frank.wells@example.com	890 Oak Avenue	175 cm	80 kg	A-	7101.699951171875
556	Albert	Barnes	Male	75	222-333-4444	albert.barnes@example.com	567 Pine Circle	160 cm	75 kg	O-	7001.4000244140625
559	Clara	Matthews	Female	68	987-654-3210	clara.matthews@example.com	123 Maple Lane	160 cm	78 kg	B+	7001.050048828125
555	Evelyn	Harrison	Female	72	666-777-8888	evelyn.harrison@example.com	234 Elm Lane	155 cm	68 kg	B+	6802.400146484375
570	Leonard	Newton	Male	63	111-222-3333	leonard.newton@example.com	789 Pine Lane	160 cm	78 kg	A+	6401
561	Mabel	Watson	Female	72	666-777-8888	mabel.watson@example.com	789 Elm Street	170 cm	68 kg	B+	6001.5
564	Oscar	Bryant	Male	76	444-555-6666	oscar.bryant@example.com	456 Oak Lane	180 cm	85 kg	B-	6001.2001953125
552	George	Henderson	Male	58	444-555-6666	george.henderson@example....	456 Oak Street	170 cm	75 kg	B-	5801.75
568	Max	Ferguson	Male	72	333-444-5555	max.ferguson@example.com	123 Cedar Street	175 cm	80 kg	O-	5600.89990234375
557	Violet	Gibson	Female	78	333-444-5555	violet.gibson@example.com	789 Cedar Street	165 cm	72 kg	AB-	5201.85009765625
566	Hugo	Harvey	Male	61	555-123-4567	hugo.harvey@example.com	789 Pine Avenue	165 cm	72 kg	AB-	5000.5
553	Charlotte	Collins	Female	65	777-888-9999	charlotte.collins@example.com	789 Pine Lane	155 cm	70 kg	A+	4801
551	Eleanor	Baker	Female	55	111-222-3333	eleanor.baker@example.com	123 Cedar Ave...	160 cm	65 kg	A+	4501.5
501	Mary	Johnson	Female	75	987-654-3210	mary.johnson@example.com	456 Senior Ave...	160 cm	65 kg	B-	4400.75

Result 2

3. What is the most preferred payment method.

```
SELECT
    PaymentMethod,
    COUNT(PatientBillID) AS PaymentCount
FROM
    hospitaldbms.patientbill
GROUP BY
    PaymentMethod
ORDER BY
    PaymentCount DESC;
```

Result:

	PaymentMethod	PaymentCount
▶	Insurance	25
	Cash	15
	Credit Card	11
	Debit Card	10

4. What is the amount spent per age group on hospital bills.

```
WITH AgeGroups AS (
    SELECT
        CASE
            WHEN Age BETWEEN 0 AND 18 THEN '0-18'
            WHEN Age BETWEEN 19 AND 30 THEN '19-30'
            WHEN Age BETWEEN 31 AND 45 THEN '31-45'
            WHEN Age BETWEEN 46 AND 60 THEN '46-60'
            ELSE '61+'
        END AS AgeGroup,
        PatientID
    FROM
        hospitaldbms.patient
)

SELECT
    ag.AgeGroup,
    SUM(pb.Amount) AS TotalAmountBilled
FROM
    AgeGroups ag
JOIN
    hospitaldbms.patientrecord pr ON ag.PatientID = pr.PatientID
JOIN
    hospitaldbms.patientbill pb ON pr.PatientRecordID = pb.PatientRecordID
GROUP BY
    ag.AgeGroup
ORDER BY
    TotalAmountBilled DESC;
```

Result:

	AgeGroup	TotalAmountBilled
▶	61+	119828.2509765625
	46-60	10303.25
	19-30	1200.800048828125

5. What is the count of visits in hospital for a particular age group.

```
WITH AgeGroups AS (
    SELECT
        CASE
            WHEN Age BETWEEN 0 AND 18 THEN '0-18'
            WHEN Age BETWEEN 19 AND 30 THEN '19-30'
            WHEN Age BETWEEN 31 AND 45 THEN '31-45'
            WHEN Age BETWEEN 46 AND 60 THEN '46-60'
            ELSE '61+'
        END AS AgeGroup,
        PatientID
    FROM
        hospitaldbms.patient
)

SELECT
    ag.AgeGroup,
    COUNT(pr.PatientRecordID) AS VisitCount
FROM
    AgeGroups ag
JOIN
    hospitaldbms.patientrecord pr ON ag.PatientID = pr.PatientID
GROUP BY
    ag.AgeGroup
ORDER BY
    VisitCount DESC;
```

Result:

	AgeGroup	VisitCount
▶	61+	44
	46-60	11
	0-18	8
	19-30	6
	31-45	4

6. Who are the top 5 hardworking employees who treated maximum patients.

```
SELECT
    e.EmployeeID, e.FName, e.LName, er.RoleDescription AS EmployeeRole,
    COUNT(pr.PatientID) AS PatientsTreated
FROM
    hospitaldbms.employee e
JOIN
    hospitaldbms.patientrecord pr ON e.EmployeeID = pr.EmployeeID
JOIN
    hospitaldbms.employeerole er ON e.EmpRoleID = er.EmpRoleID
GROUP BY
    e.EmployeeID
ORDER BY
    PatientsTreated DESC
LIMIT 5;
```

Result:

EmployeeID	FName	LName	EmployeeRole	PatientsTreated
302	David	Johnson	Doctor	14
301	Jane	Smith	Nurse	11
300	John	Doe	Doctor	9
305	Samantha	Miller	Radiologist	7
308	Daniel	Clark	Administrative Staff	6

7. Which patients underwent the maximum number of lab tests.

```
SELECT
    pr.PatientID,
    p.FName,
    p.LName,
    COUNT(rt.LabTestID) AS LabTestsCount
FROM
    hospitaldbms.patientrecord pr
JOIN
    hospitaldbms.report rt ON pr.PatientRecordID = rt.PatientRecordID
JOIN
    hospitaldbms.patient p ON pr.PatientID = p.PatientID
GROUP BY
    pr.PatientID
ORDER BY
    LabTestsCount DESC;
```

Result:

PatientID	FName	LName	LabTestsCount
501	Mary	Johnson	3
500	John	Smith	3
551	Eleanor	Baker	3
570	Leonard	Newton	2
569	Ruby	Reynolds	2
568	Max	Ferguson	2
567	Eva	Fletcher	2
566	Hugo	Harvey	2
565	Lillian	Carter	2
564	Oscar	Bryant	2
563	Edith	Simmons	2
562	Walter	Olson	2
561	Mabel	Watson	2
560	Samuel	Hunter	2
559	Clara	Matthews	2
558	Frank	Wells	2
557	Violet	Gibson	2
556	Albert	Barnes	2
555	Evelyn	Harrison	2
554	Henry	Simpson	2
553	Charlotte	Collins	2
552	George	Henderson	2

Result 7

8. What is the number of Lab tests performed by patients based on their age group.

```
WITH AgeGroups AS (
    SELECT
        CASE
            WHEN Age BETWEEN 0 AND 18 THEN '0-18'
            WHEN Age BETWEEN 19 AND 30 THEN '19-30'
            WHEN Age BETWEEN 31 AND 45 THEN '31-45'
            WHEN Age BETWEEN 46 AND 60 THEN '46-60'
            ELSE '61+'
        END AS AgeGroup,
        PatientID
    FROM
        hospitaldbms.patient
)

SELECT
    ag.AgeGroup,
    COUNT(rt.LabTestID) AS LabTestsCount
FROM
    AgeGroups ag
JOIN
    hospitaldbms.patientrecord pr ON ag.PatientID = pr.PatientID
JOIN
    hospitaldbms.report rt ON pr.PatientRecordID = rt.PatientRecordID
JOIN
    hospitaldbms.patient p ON pr.PatientID = p.PatientID
GROUP BY
    ag.AgeGroup
ORDER BY
    LabTestsCount DESC;
```

Result:

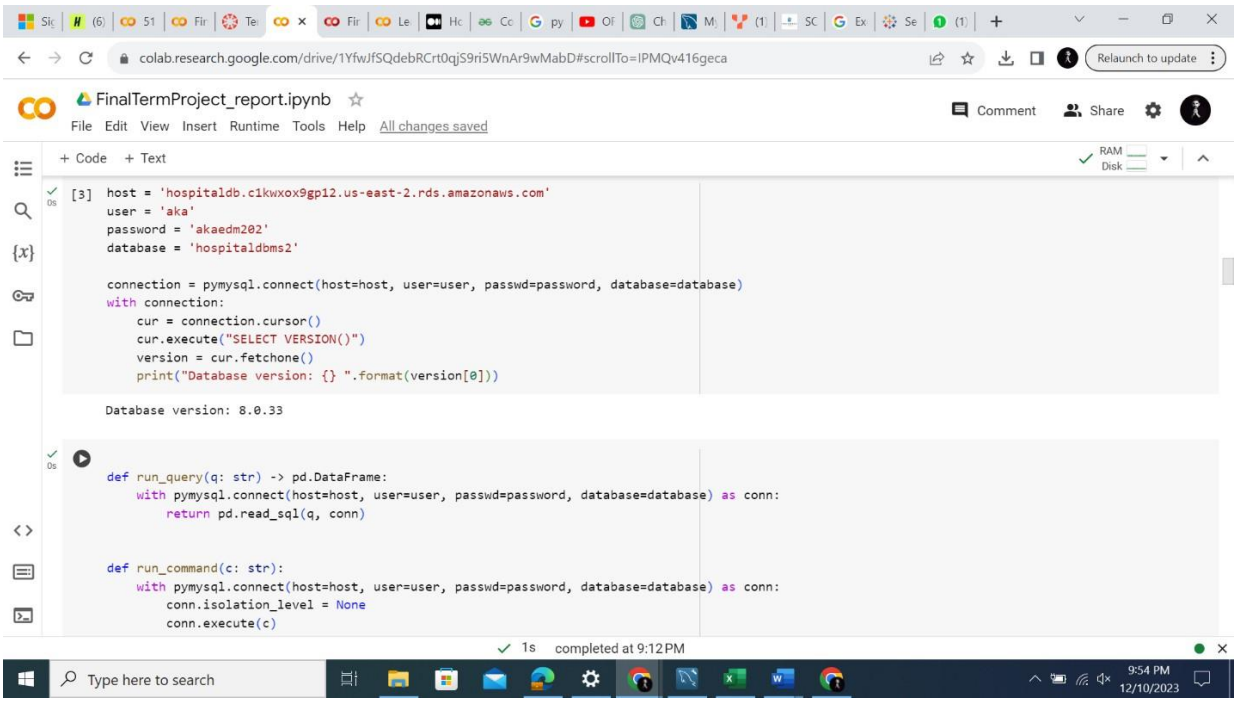
	AgeGroup	LabTestsCount
▶	61+	44
	46-60	5
	19-30	2

We have done Data Visualization in 2 ways: -

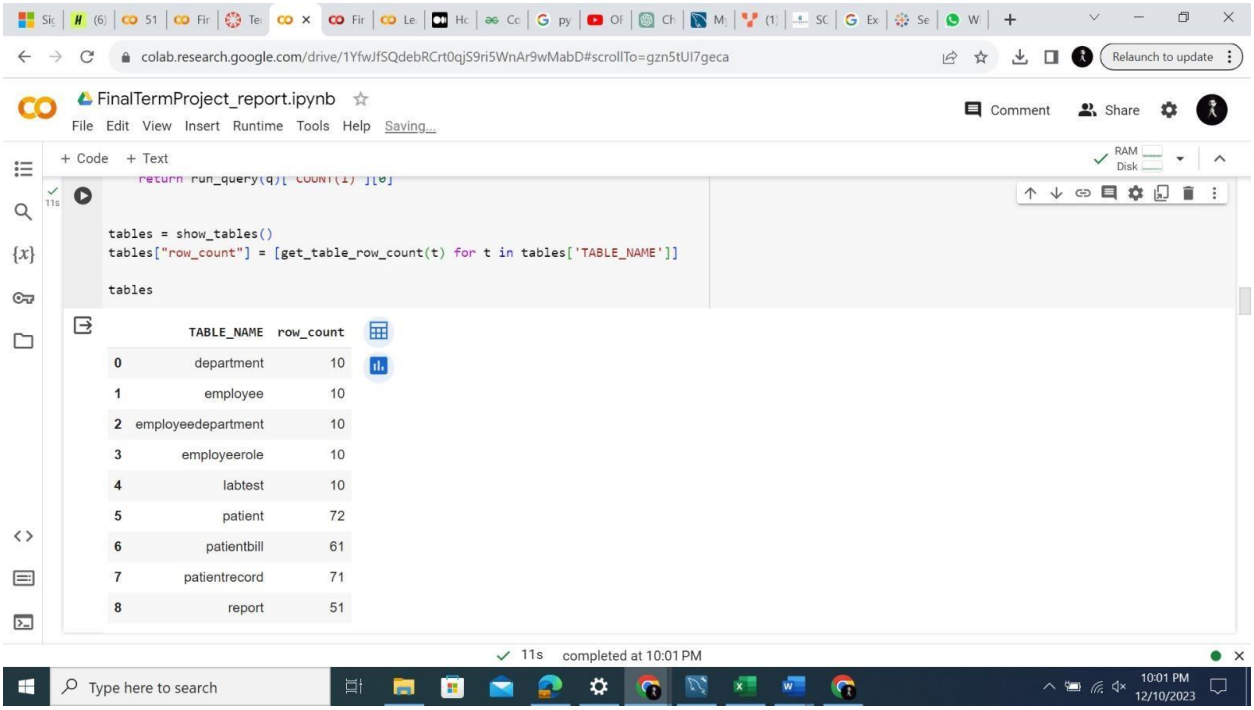
1. **Python**
2. **Tableau**

First approach via Python –

Step 1 – Establishing Connection

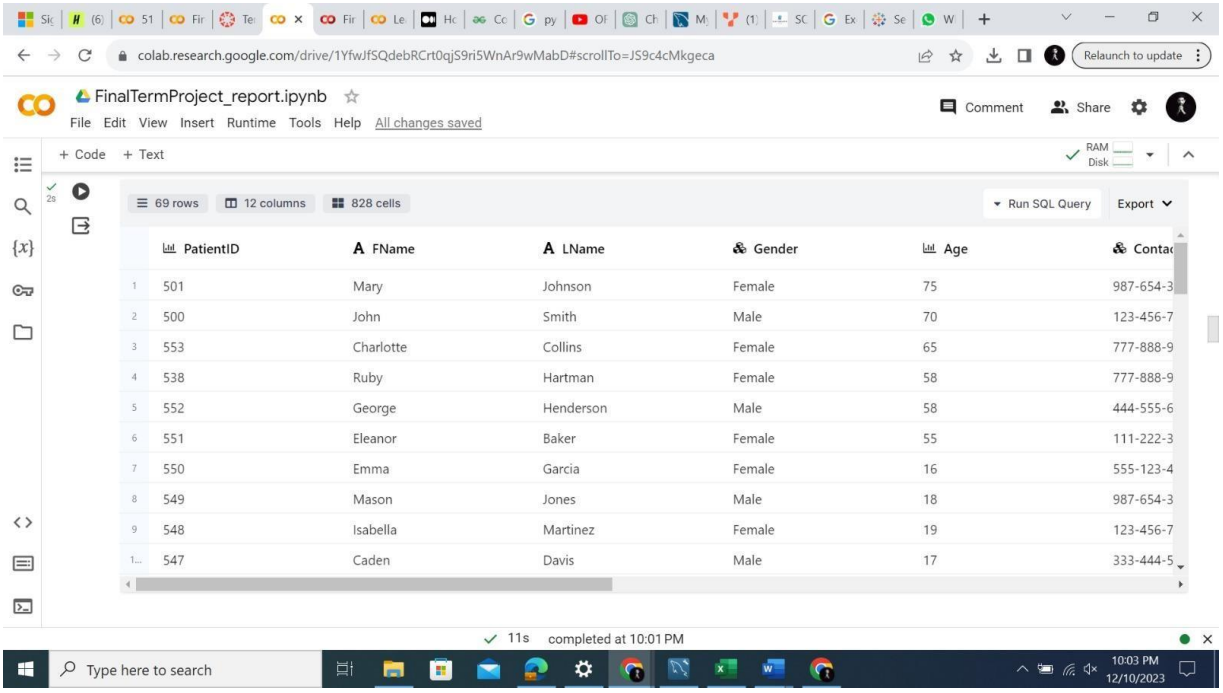


Step 2 – Details of Database

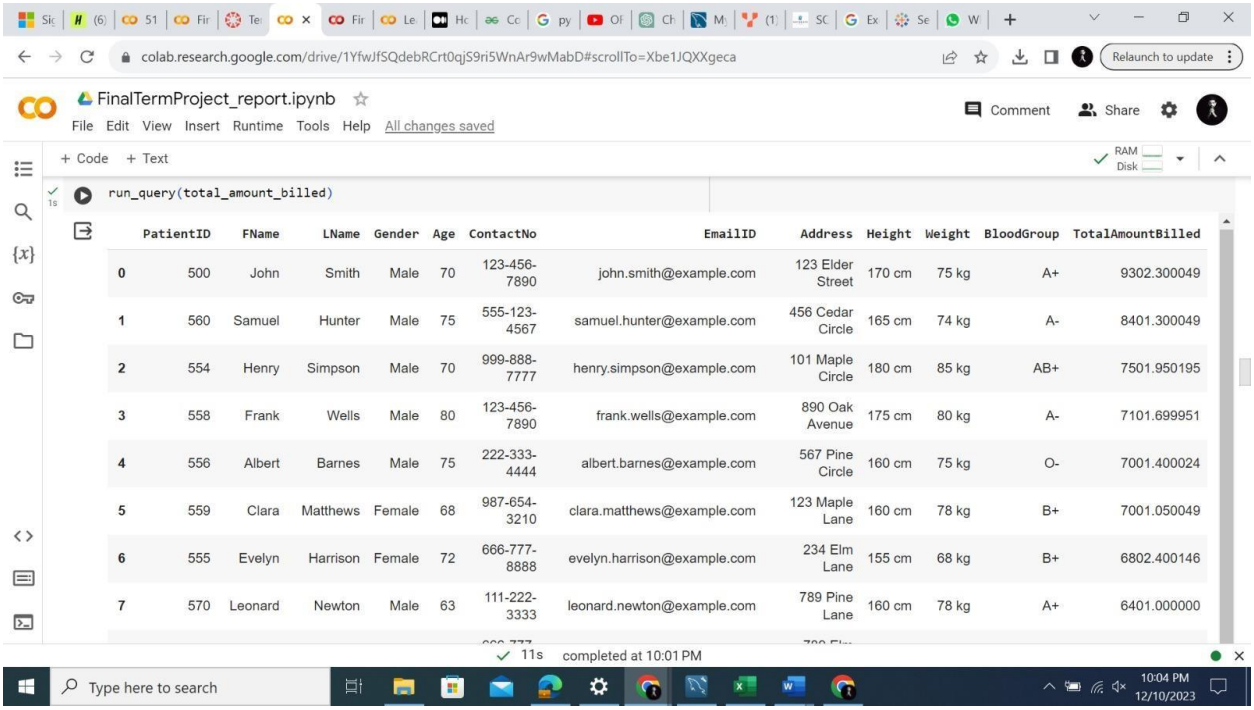


Step 3 – Analytics Queries and its Data Viz output in python.

How many times has a patient visited the hospital.

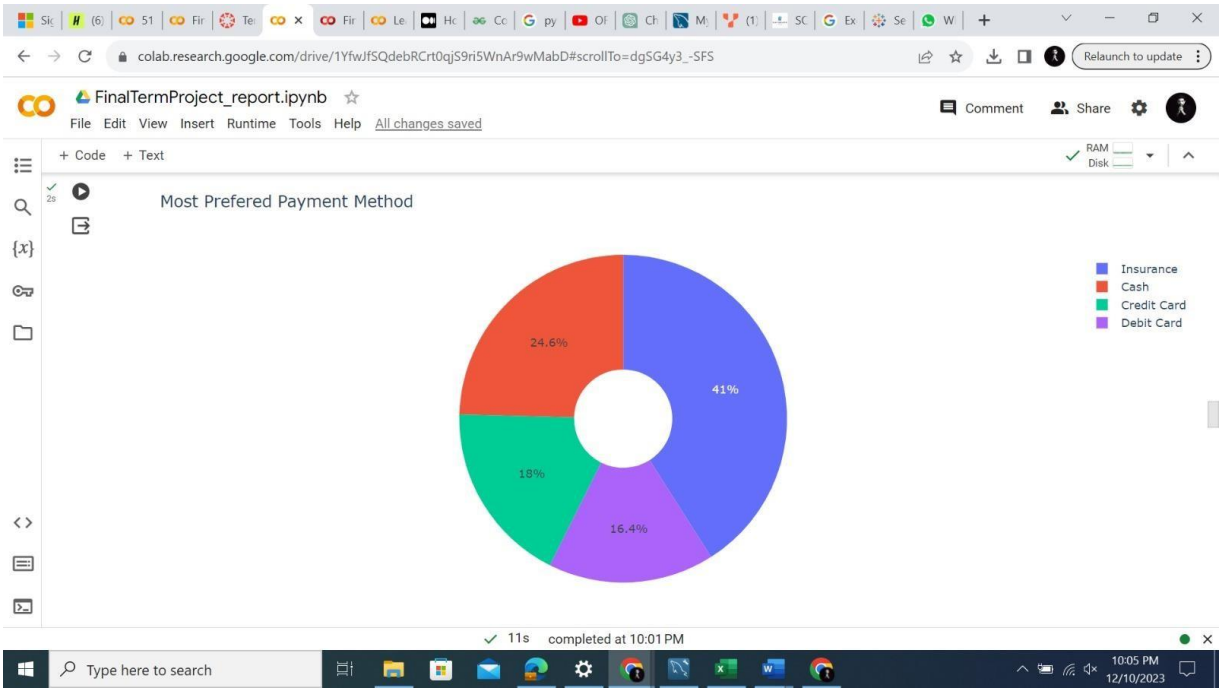


What is the total amount billed by a particular patient throughout his/her visits.

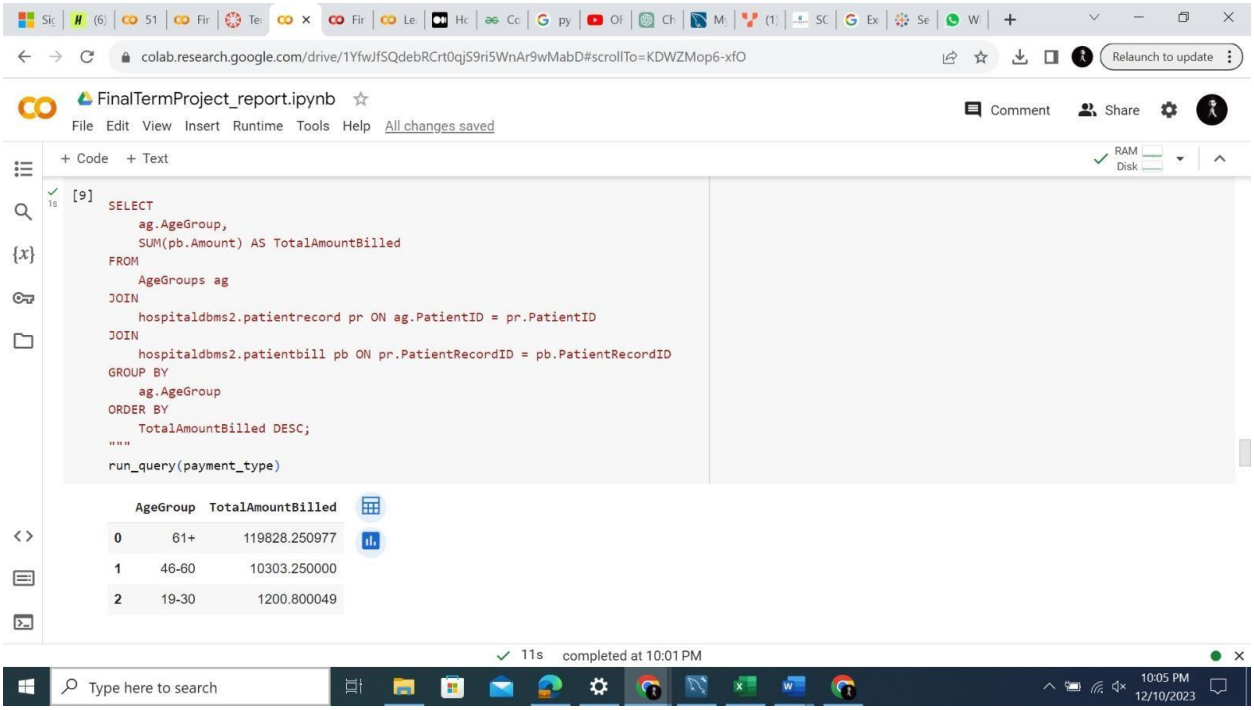


	PatientID	FName	LName	Gender	Age	ContactNo	EmailID	Address	Height	Weight	BloodGroup	TotalAmountBilled
0	500	John	Smith	Male	70	123-456-7890	john.smith@example.com	123 Elder Street	170 cm	75 kg	A+	9302.300049
1	560	Samuel	Hunter	Male	75	555-123-4567	samuel.hunter@example.com	456 Cedar Circle	165 cm	74 kg	A-	8401.300049
2	554	Henry	Simpson	Male	70	999-888-7777	henry.simpson@example.com	101 Maple Circle	180 cm	85 kg	AB+	7501.950195
3	558	Frank	Wells	Male	80	123-456-7890	frank.wells@example.com	890 Oak Avenue	175 cm	80 kg	A-	7101.699951
4	556	Albert	Barnes	Male	75	222-333-4444	albert.barnes@example.com	567 Pine Circle	160 cm	75 kg	O-	7001.400024
5	559	Clara	Matthews	Female	68	987-654-3210	clara.matthews@example.com	123 Maple Lane	160 cm	78 kg	B+	7001.050049
6	555	Evelyn	Harrison	Female	72	666-777-8888	evelyn.harrison@example.com	234 Elm Lane	155 cm	68 kg	B+	6802.400146
7	570	Leonard	Newton	Male	63	111-222-3333	leonard.newton@example.com	789 Pine Lane	160 cm	78 kg	A+	6401.000000

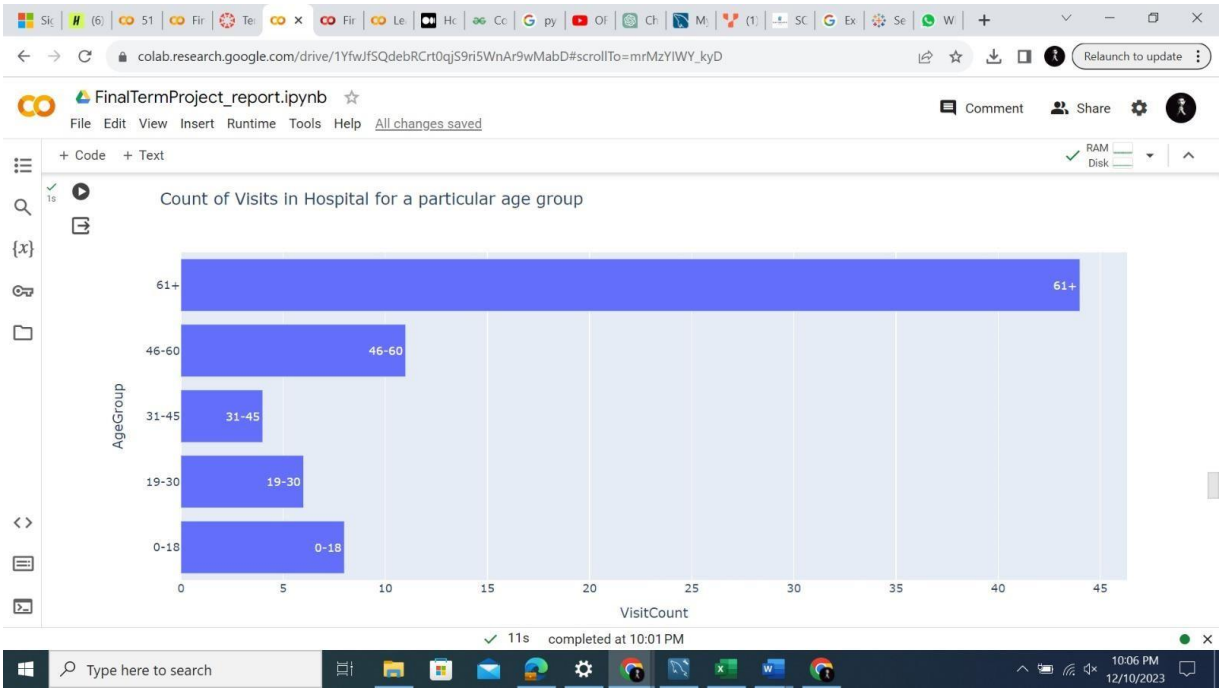
What is the most preferred payment method



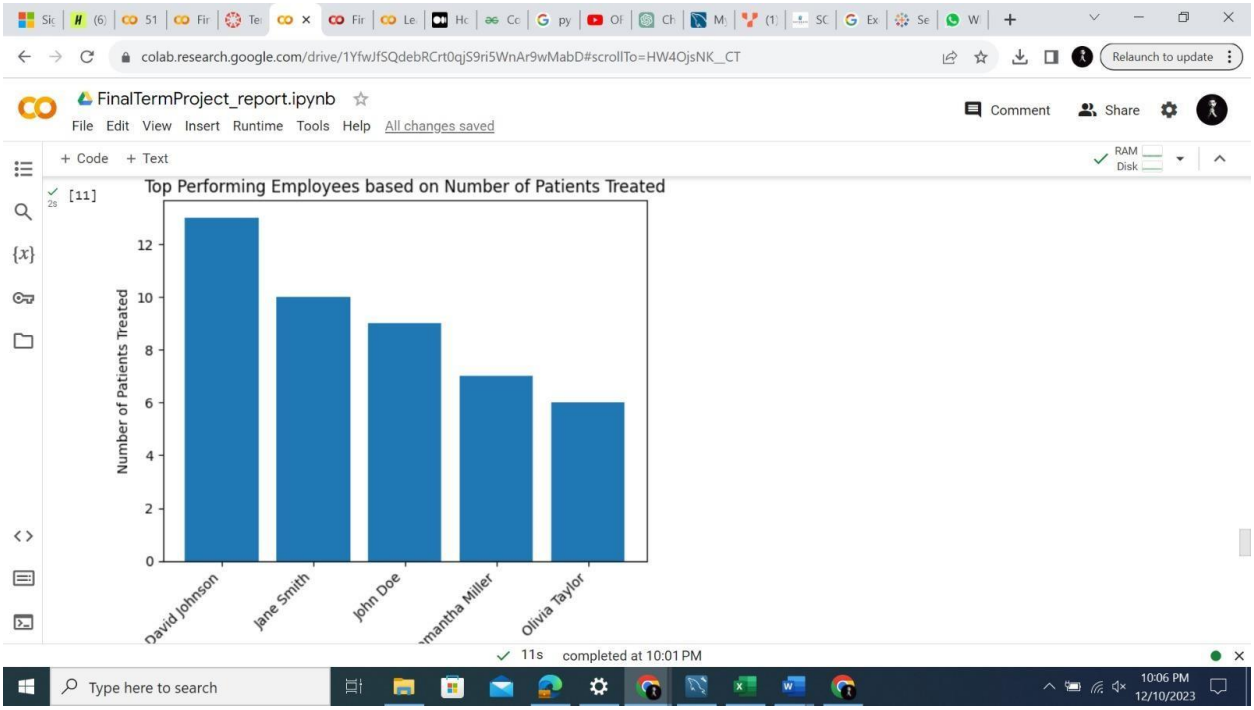
What is the amount spent per age group on hospital bills.



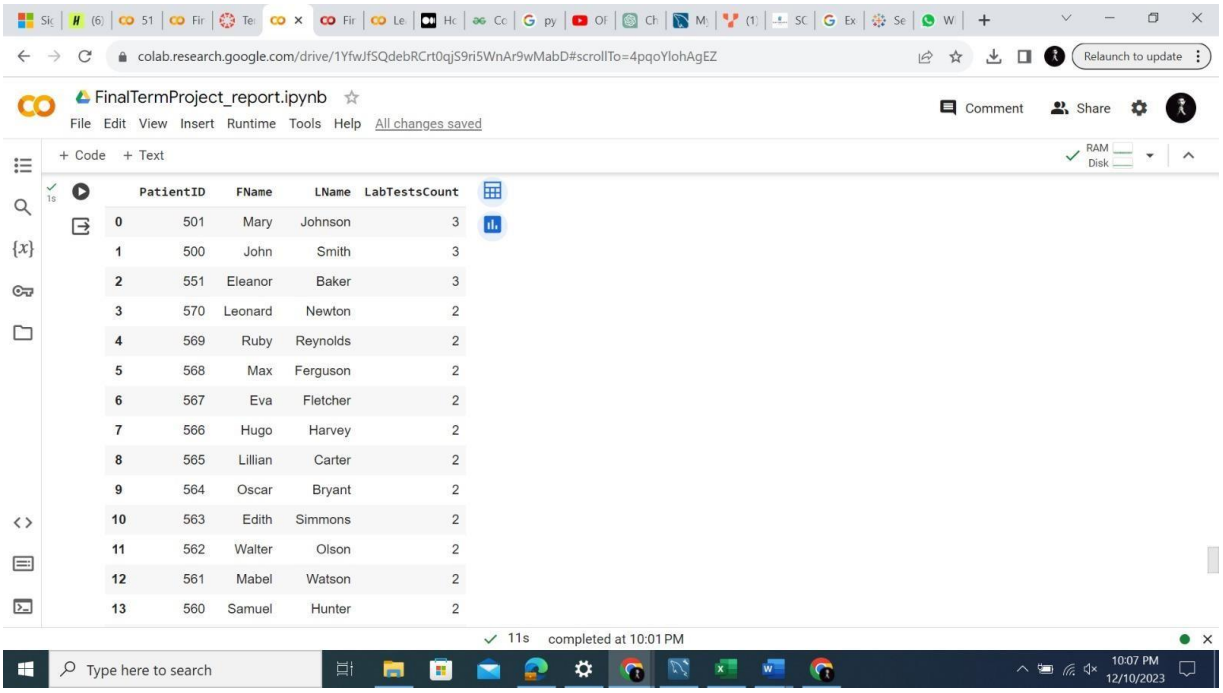
What is the count of visits in hospital for a particular age group



Who are the top 5 hardworking employees who treated maximum patients

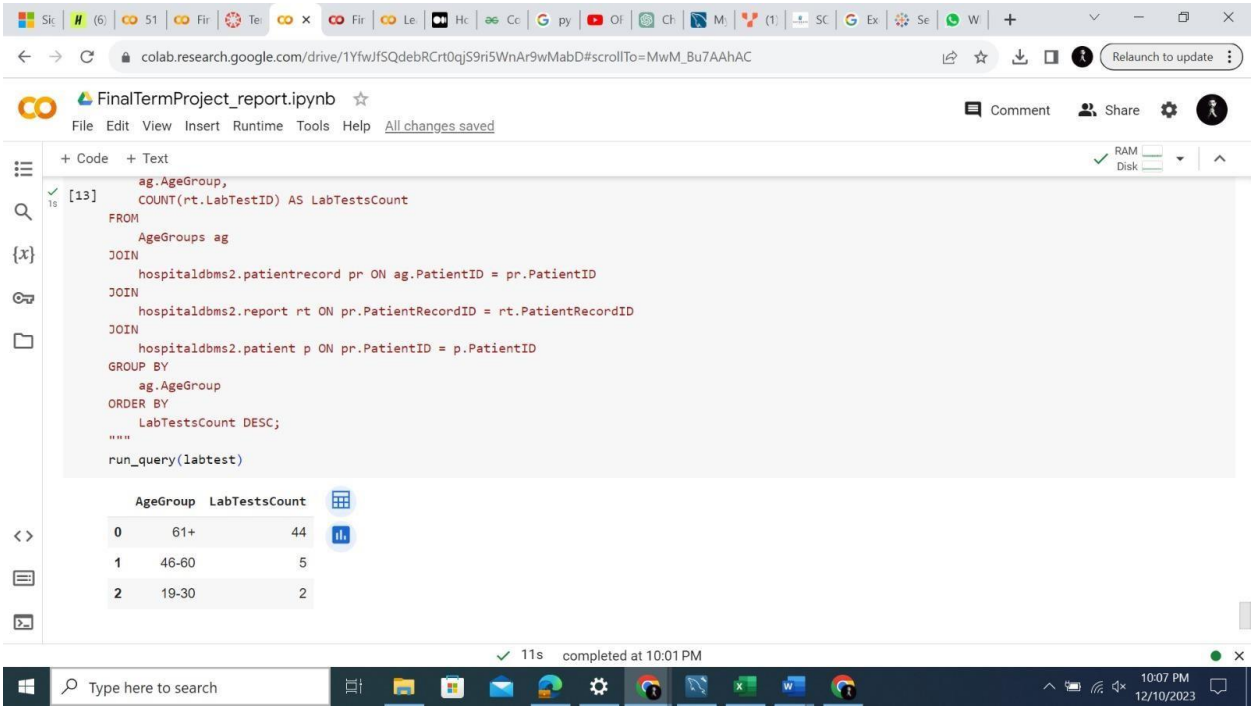


Which patients underwent the maximum number of lab tests.



	PatientID	FName	LName	LabTestsCount
0	501	Mary	Johnson	3
1	500	John	Smith	3
2	551	Eleanor	Baker	3
3	570	Leonard	Newton	2
4	569	Ruby	Reynolds	2
5	568	Max	Ferguson	2
6	567	Eva	Fletcher	2
7	566	Hugo	Harvey	2
8	565	Lillian	Carter	2
9	564	Oscar	Bryant	2
10	563	Edith	Simmons	2
11	562	Walter	Olson	2
12	561	Mabel	Watson	2
13	560	Samuel	Hunter	2

What is the number of Lab tests performed by patients based on their age group.



Collab File - [Python File with all Outputs]

Second approach via Tableau –

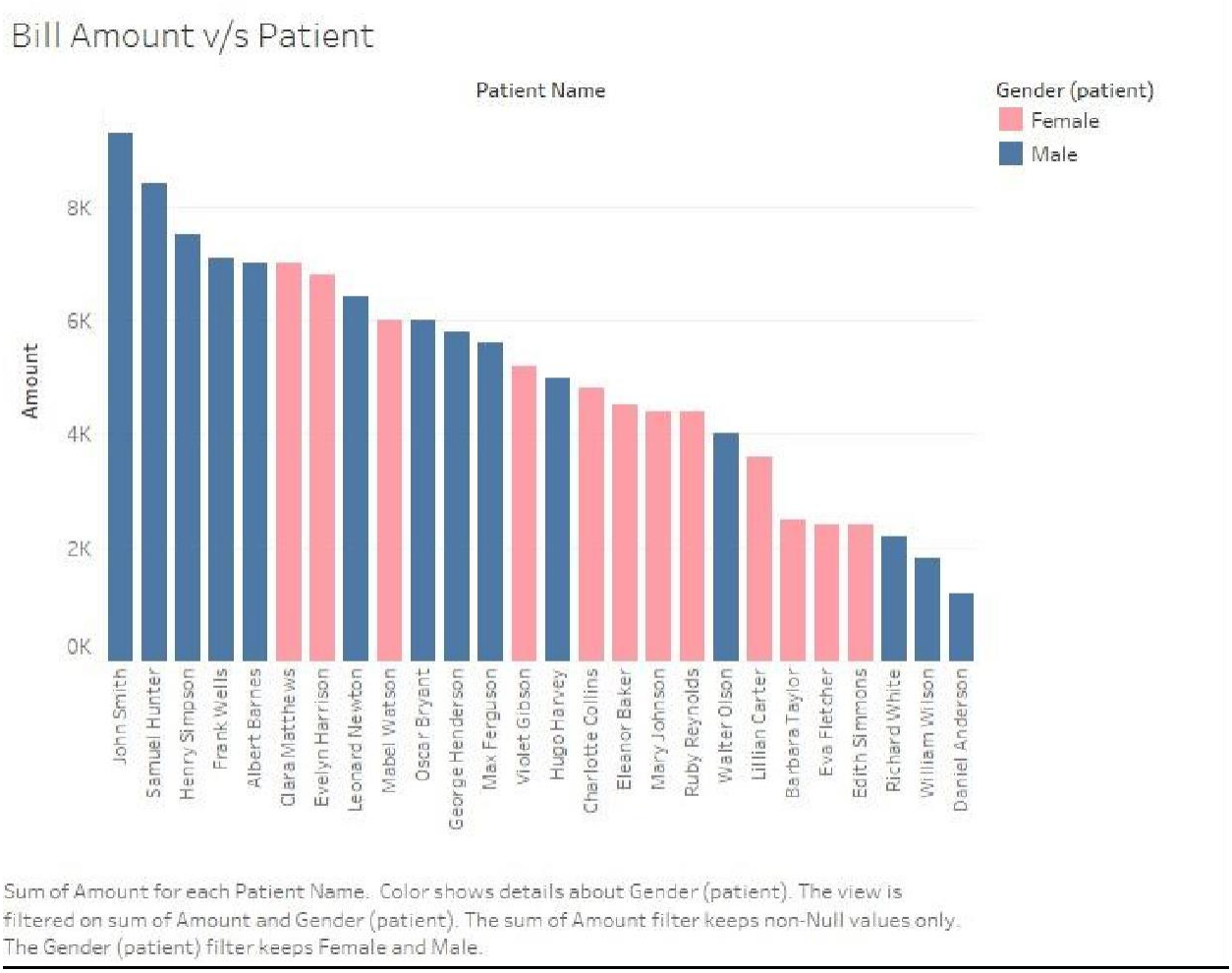
Worksheets of Tableau

Database information-

KPI

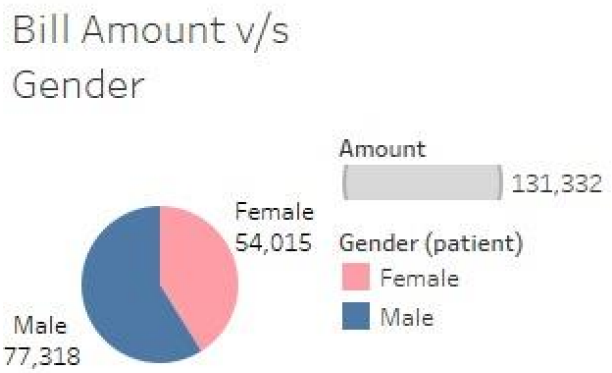
# of Departments	10
# of Emp Roles	7
# of Employees	10
# of Labtests	10
# of Patients	72

What is the total amount billed by a particular patient throughout his/her visits.



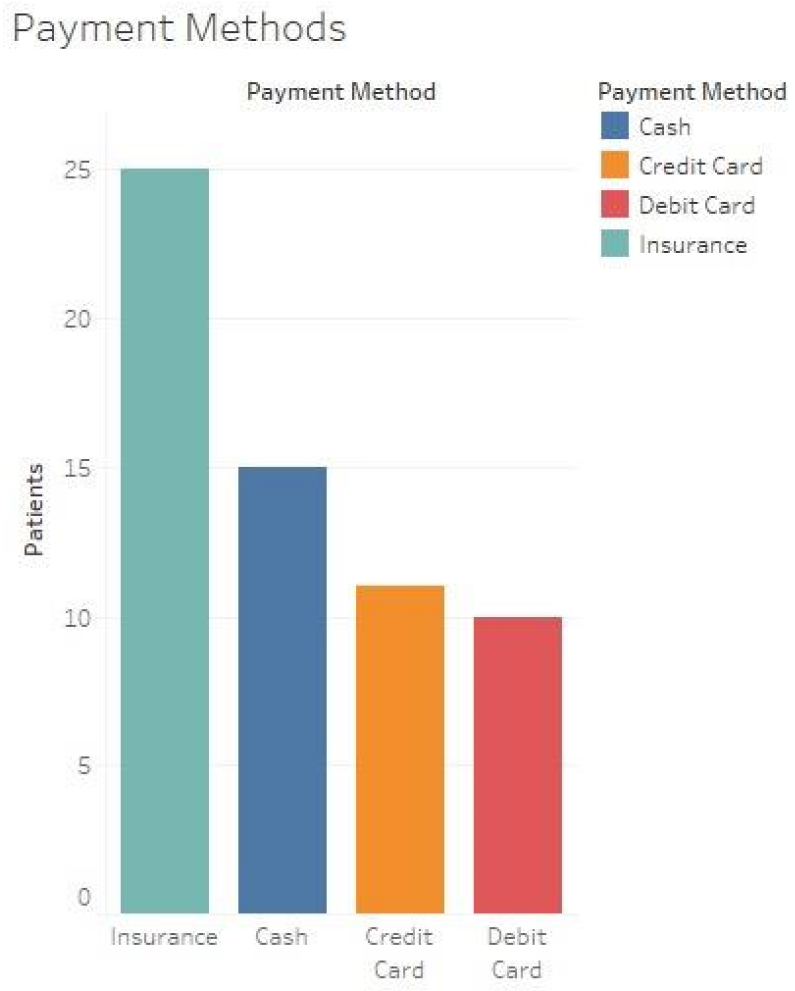
Sum of Amount for each Patient Name. Color shows details about Gender (patient). The view is filtered on sum of Amount and Gender (patient). The sum of Amount filter keeps non-Null values only. The Gender (patient) filter keeps Female and Male.

What is the amount billed based on gender for all patients

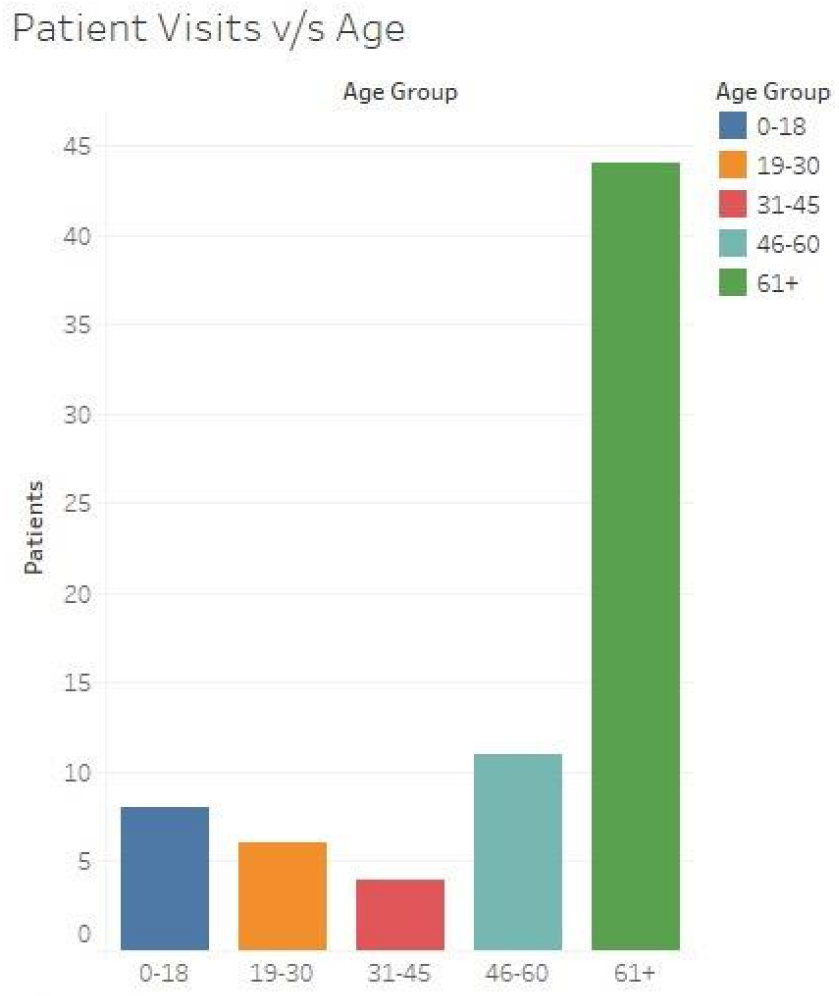


Gender (patient) and sum of Amount. Color shows details about Gender (patient). Size shows sum of Amount. The marks are labeled by Gender (patient) and sum of Amount. The view is filtered on Gender (patient), which keeps Female and Male.

What is the most preferred payment method.

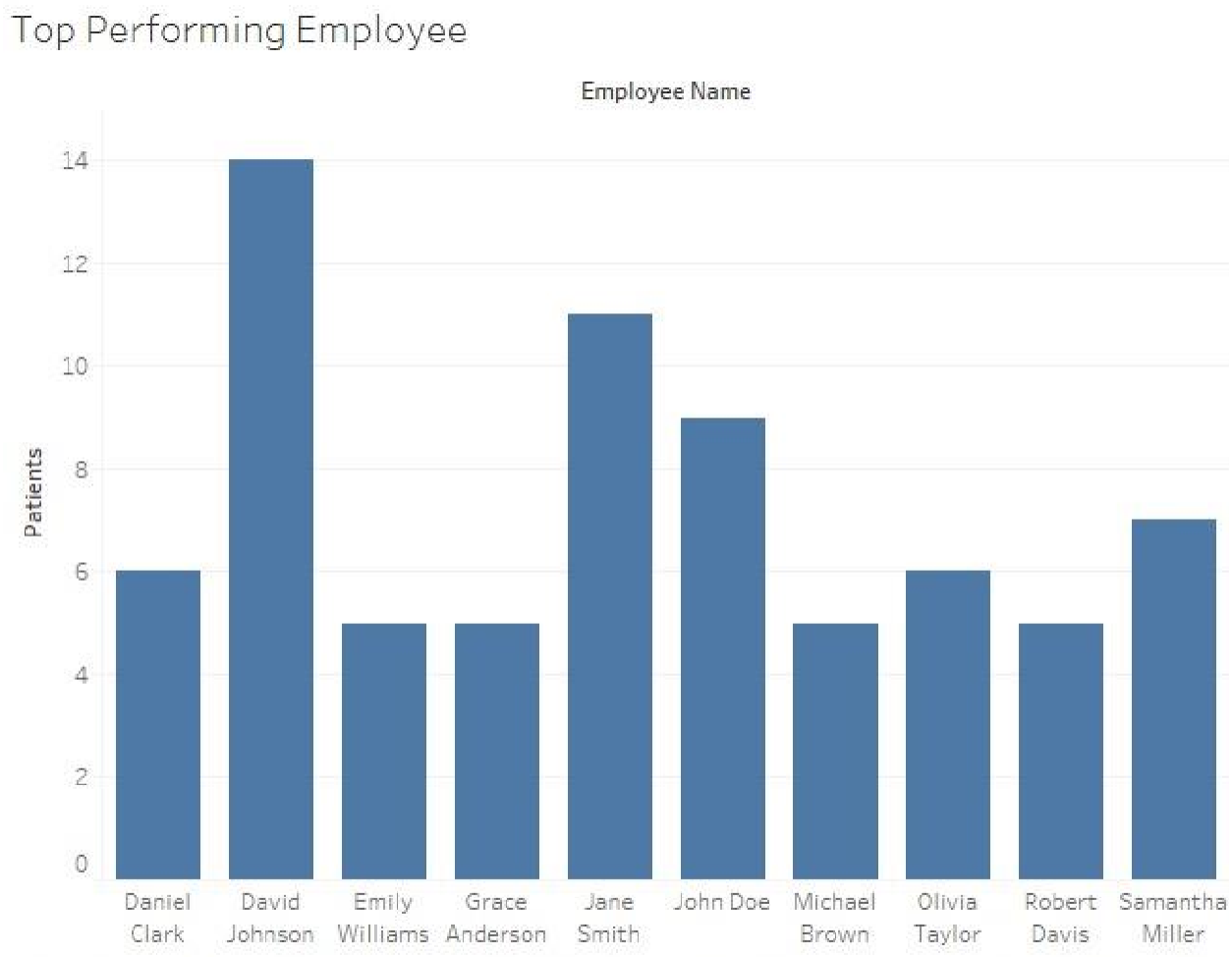


What is the count of visits in hospital for a particular age group.



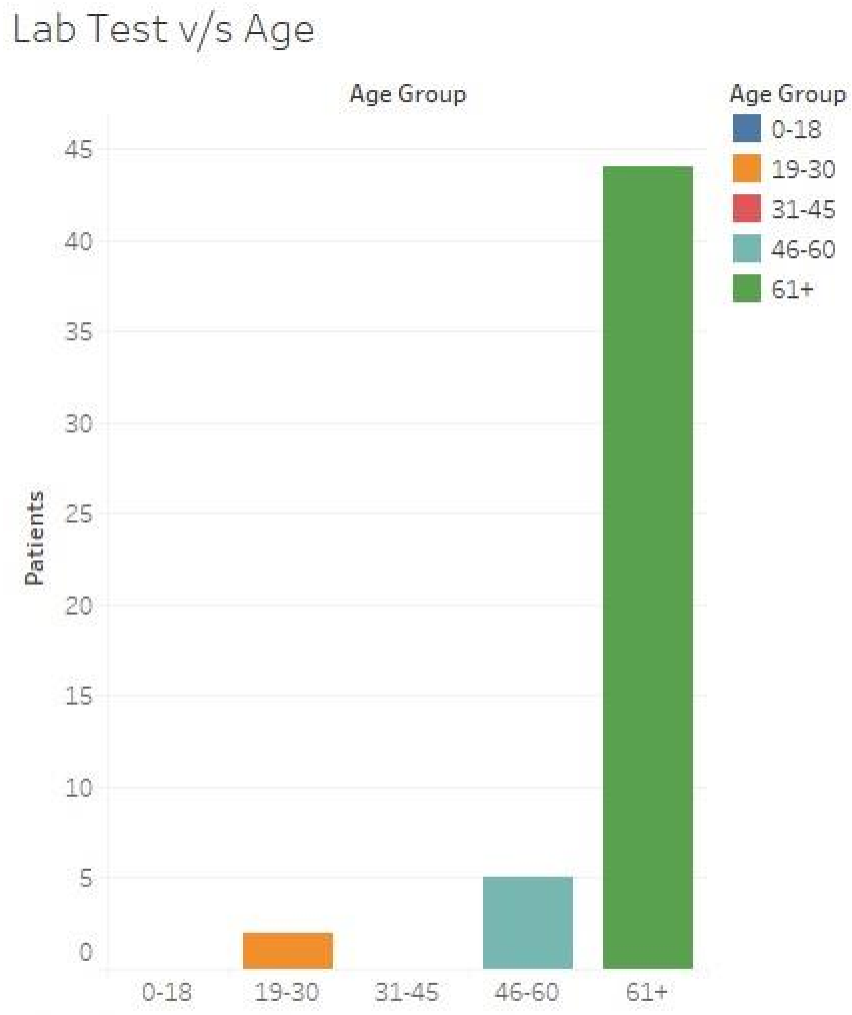
Count of patientrecord for each Age Group. Color shows details about Age Group. The data is filtered on Gender (patient), which keeps Female and Male.

Who are the hardworking employees who treated maximum patients.



Count of Patient ID for each Employee Name. The data is filtered on Role Description and Gender (patient). The Role Description filter keeps 7 of 7 members. The Gender (patient) filter keeps Female and Male.

What is the number of Lab tests performed by patients based on their age group.



Count of PatientRecordID (report) for each Age Group. Color shows details about Age Group. The data is filtered on Gender (patient), which keeps Female and Male.

Final Dashboard

Link for Dashboard: [Dashboard with the help of Tableau]

Analysis Key Insights

1. Patients Mary Johnson & John Smith were admitted to the hospital twice and rest all just once.
2. Patient John Smith spent most amount on hospital bill which is $9302.30.
3. Most preferred payment method is insurance which is about 41%.
4. All senior citizens (61years +) spent the maximum amount on hospital bill which is $119828.25.
5. Amongst the admitted patients, maximum were senior citizens (61years +).
6. Dr. David Johnson was the top performing employee who treated 41 patients.
7. Patients Mary Johnson, John Smith & Eleanor Baker did the 3 (the most) Lab tests.
8. Maximum Lab tests were performed by the age group of 61+ which were 44.

Conclusion

In our project Hospital Management system, we have all the data pertaining to the doctors, patients, staff, and patients who come to the hospital for treatment saved. Hospitals may manage, generate, add, and retrieve patient data with the aid of the database.