MINNESOTA TECH FOR SUCCESS

Week 16-18: Database Management and Troubleshooting

3/27/2024

Agenda

- **Announcements**
- **Classroom (25 min)**
  - How Databases are Used
    - Recap & C.R.U.D.
    - Use Cases
- **Break (5 min)**
- **Warehouse (1.5 hrs)**
  - CPUs

ANNOUNCEMENTS

Week 17

Announcements for 3/27

- **Calendar**
  - Next session: **Wednesday, 4/3/2024**
  - Spring Break: 4/8 – 4/12

- Week 16-18: Database Management and Troubleshooting – Mar. 13th, 27th, & Apr. 3rd

- Week 19-21: Hands-on Practical Skills – Apr. 17th, 24th, May 1st

Values

- **R**espect
- **A**ccountability
- **I**mprovement
- **S**teadfast
- **E**ncouragement

Database Management and Troubleshooting Objectives:

- What are databases?
  - Introduction to databases, explaining their purpose in organizing and managing data.
- Different types of databases
  - Overview of relational and non-relational (NoSQL) databases and their use cases.
- How databases are used
  - Explanation of how databases are used in various applications and industries.
- Solving common database issues
  - Guidance on identifying and addressing common database-related problems.

HOW DATABASES ARE USED

Recap & C.R.U.D.

Recap: Databases

- **Database –** Organized and structured collection of data that is held in a computer system
  - Usually controlled and manipulated by a DBMS (Database Management System)
  - RDBMS (Relational Database Management System) with SQL most common

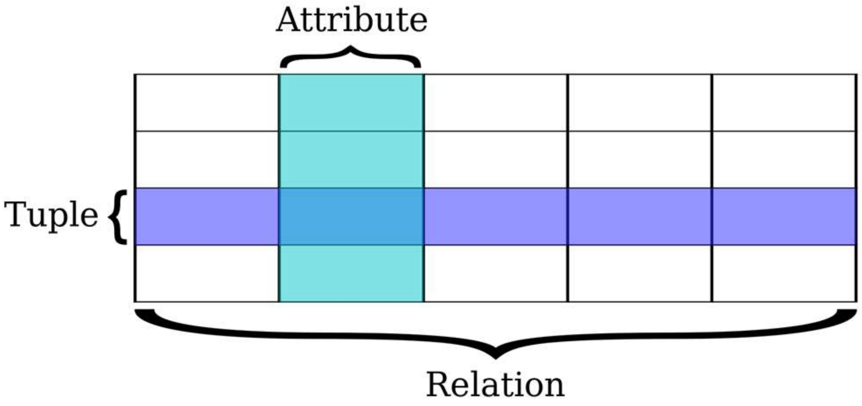
- Why do we need them?
  - So that we can store large amounts of data in one place and easily retrieve it

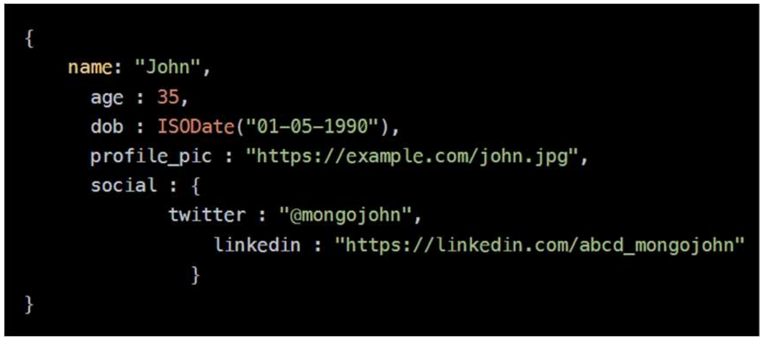
Data must be easily:

1. Stored
2. Accessed
3. Changed/modified

Recap: Types of Databases

- Hierarchical
- Network
- Object-oriented
- **Relational** (most popular is SQL)
- Cloud
- Centralized
- **NoSQL** (“not only SQL”)
  - Document databases
  - Key-value stores
  - Column-family stores
  - Graph databases





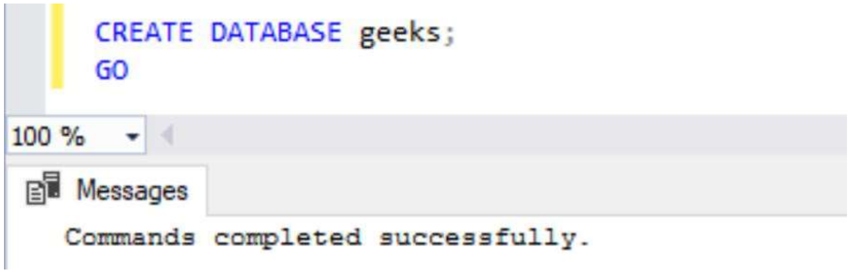
```
{
    name: "John",
      age : 35,
      dob : ISODate("01-05-1990"),
      profile_pic : "https://example.com/john.jpg",
      social : {
             twitter : "@mongojohn",
                 linkedin : "https://linkedin.com/abcd_mongojohn"
               }
}
```

C.R.U.D. Processes in Databases

- Create - Adding new data to the database
    - Ex: Creating a new row (tuple) in a database table, adding a new document to a document storage system
- Read - Retrieving existing data from the database
    - Ex: Reading a row from a database table, retrieving a document from a document storage system
- Update - Modifying existing data in the database
    - Ex: updating the value of a column (attribute) in a database table, editing the content of a document in a document storage system
- Delete - The process of removing data from the database
    - Ex: deleting a row from a database table, removing a document from a document storage system

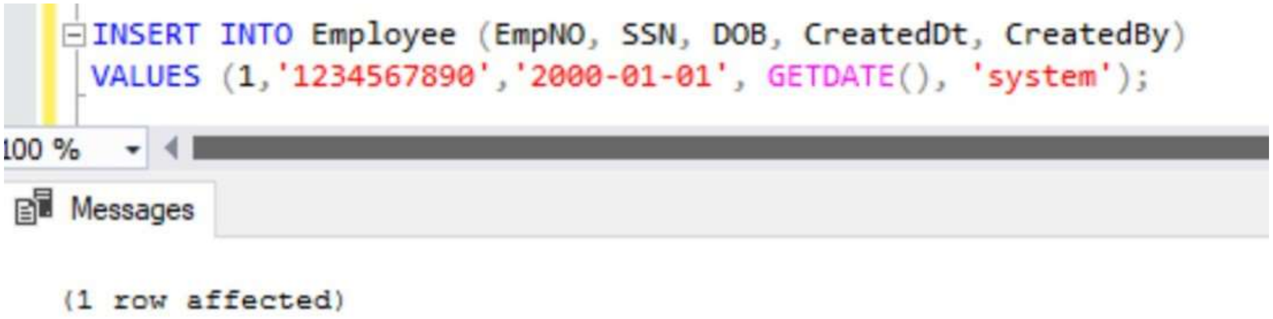
C.R.U.D. Example in SQL

Create



```sql
CREATE DATABASE geeks;
GO
```

```
Commands completed successfully.
```

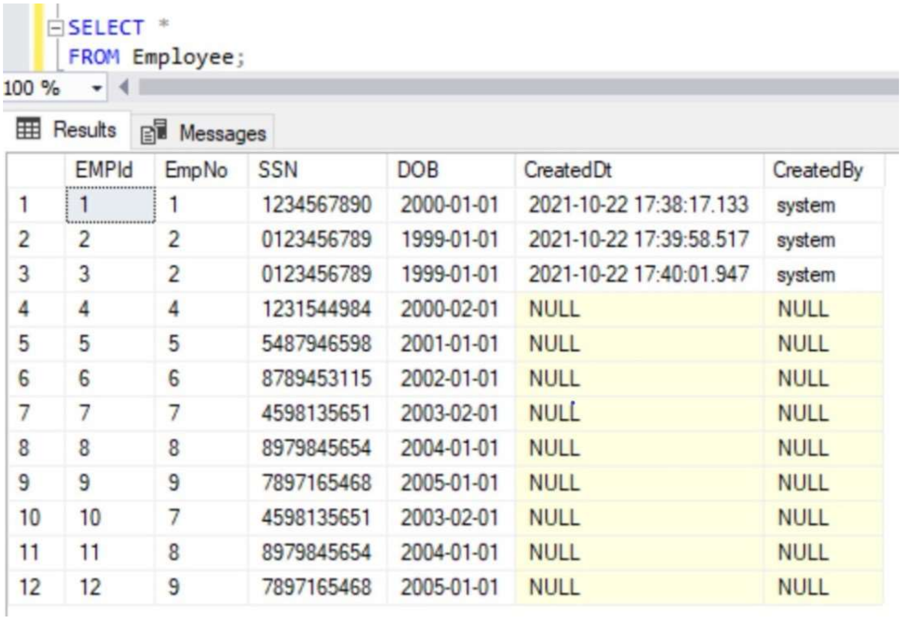


```sql
INSERT INTO Employee (EmpNO, SSN, DOB, CreatedDt, CreatedBy)
VALUES (1,'1234567890','2000-01-01', GETDATE(), 'system');
```

```
(1 row affected)
```

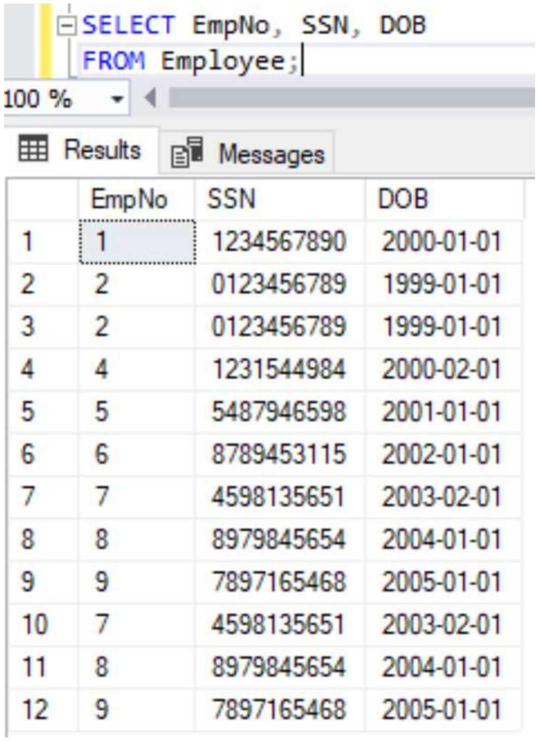
C.R.U.D. Example in SQL

Read



```sql
SELECT *
FROM Employee;
```

	EMPId	EmpNo	SSN	DOB	CreatedDt	CreatedBy
1	1	1	1234567890	2000-01-01	2021-10-22 17:38:17.133	system
2	2	2	0123456789	1999-01-01	2021-10-22 17:39:58.517	system
3	3	2	0123456789	1999-01-01	2021-10-22 17:40:01.947	system
4	4	4	1231544984	2000-02-01	NULL	NULL
5	5	5	5487946598	2001-01-01	NULL	NULL
6	6	6	8789453115	2002-01-01	NULL	NULL
7	7	7	4598135651	2003-02-01	NULL	NULL
8	8	8	8979845654	2004-01-01	NULL	NULL
9	9	9	7897165468	2005-01-01	NULL	NULL
10	10	7	4598135651	2003-02-01	NULL	NULL
11	11	8	8979845654	2004-01-01	NULL	NULL
12	12	9	7897165468	2005-01-01	NULL	NULL

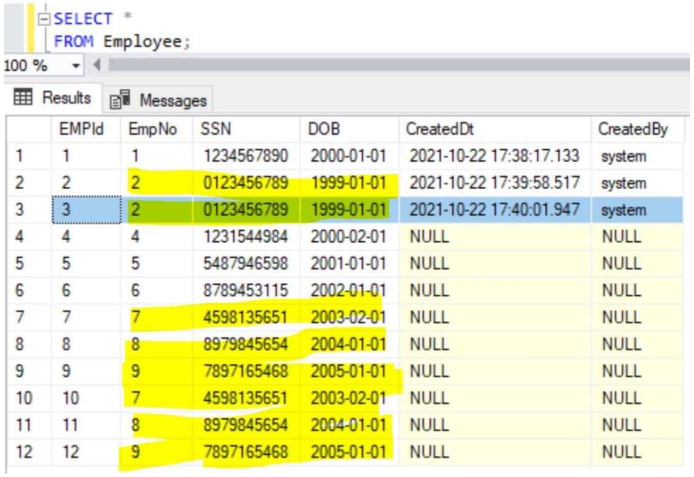


```sql
SELECT EmpNo, SSN, DOB
FROM Employee;
```

	EmpNo	SSN	DOB
1	1	1234567890	2000-01-01
2	2	0123456789	1999-01-01
3	2	0123456789	1999-01-01
4	4	1231544984	2000-02-01
5	5	5487946598	2001-01-01
6	6	8789453115	2002-01-01
7	7	4598135651	2003-02-01
8	8	8979845654	2004-01-01
9	9	7897165468	2005-01-01
10	7	4598135651	2003-02-01
11	8	8979845654	2004-01-01
12	9	7897165468	2005-01-01

C.R.U.D. Example in SQL

Update



```sql
SELECT *
FROM Employee;
```

	EMPId	EmpNo	SSN	DOB	CreatedDt	CreatedBy
1	1	1	1234567890	2000-01-01	2021-10-22 17:38:17.133	system
2	2	2	0123456789	1999-01-01	2021-10-22 17:39:58.517	system
3	3	2	0123456789	1999-01-01	2021-10-22 17:40:01.947	system
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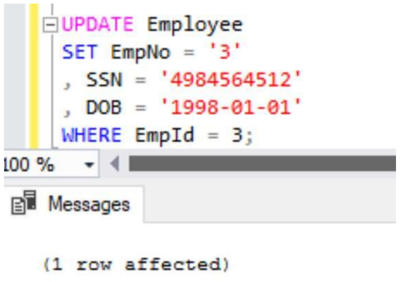
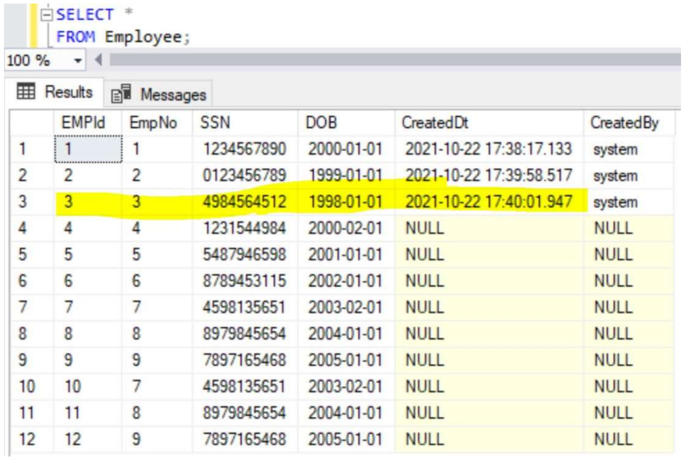


```sql
UPDATE Employee
SET EmpNo = '3'
, SSN = '4984564512'
, DOB = '1998-01-01'
WHERE EmpId = 3;
```

```
(1 row affected)
```



```sql
SELECT *
FROM Employee;
```

	EMPId	EmpNo	SSN	DOB	CreatedDt	CreatedBy
1	1	1	1234567890	2000-01-01	2021-10-22 17:38:17.133	system
2	2	2	0123456789	1999-01-01	2021-10-22 17:39:58.517	system
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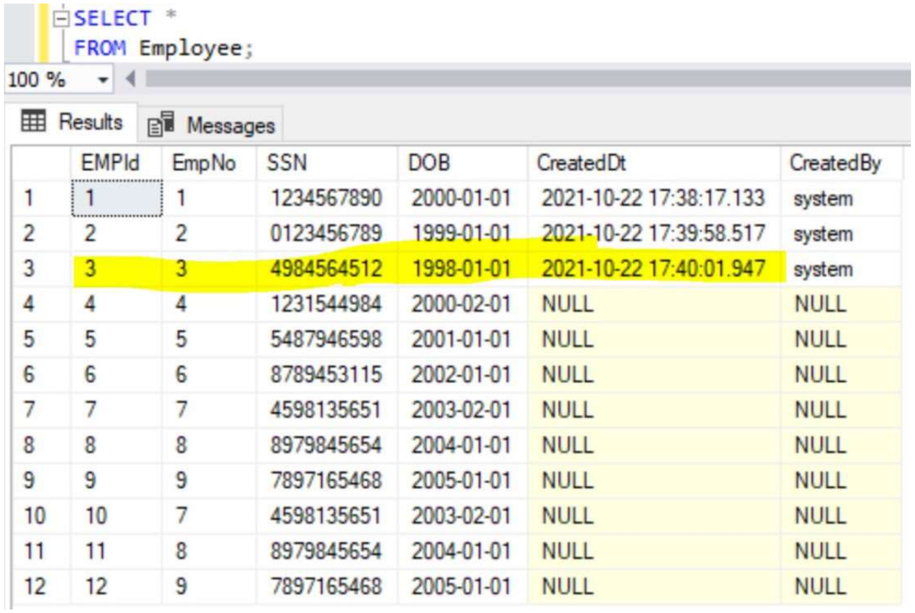
10	10	7	4598135651	2003-02-01	NULL	NULL
11	11	8	8979845654	2004-01-01	NULL	NULL
12	12	9	7897165468	2005-01-01	NULL	NULL

C.R.U.D. Example in SQL

Delete



```sql
SELECT *
FROM Employee;
```

	EMPId	EmpNo	SSN	DOB	CreatedDt	CreatedBy
1	1	1	1234567890	2000-01-01	2021-10-22 17:38:17.133	system
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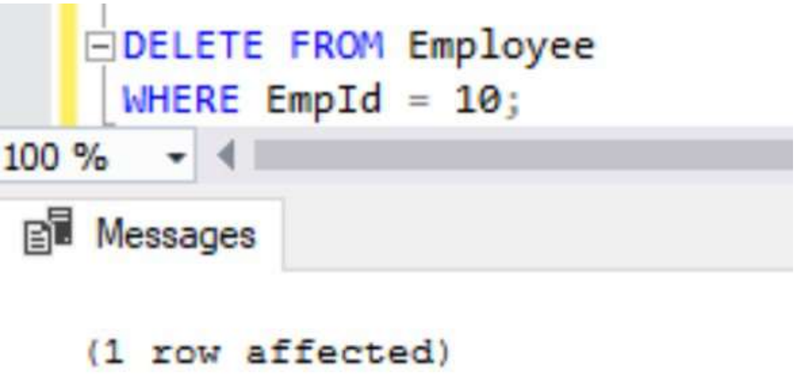


```sql
DELETE FROM Employee
WHERE EmpId = 10;
```

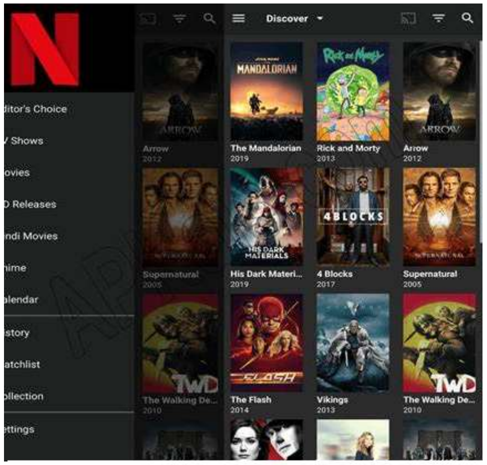
```
(1 row affected)
```

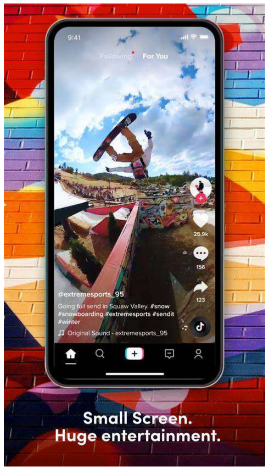
HOW DATABASES ARE USED

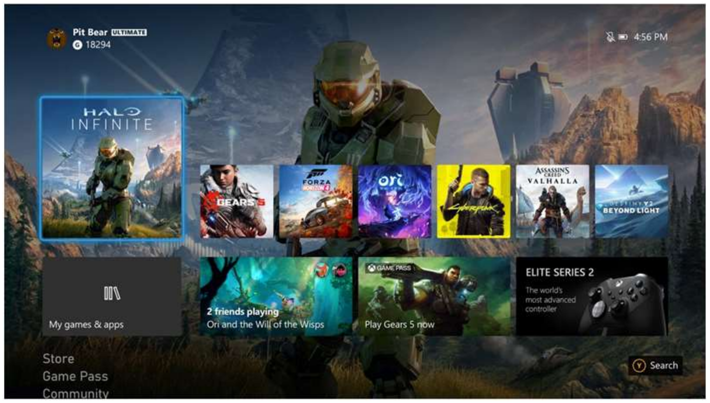
Use Cases

Databases Use Cases: Personal

- Streaming services that store and display content
  - Netflix, Hulu, Disney Plus
- Social gaming platforms that track user profile and achievements
  - Xbox Live, PlayStation Network, Steam
- Social media that store user generated content, interactions, and account history
  - Facebook, Instagram, TikTok, X

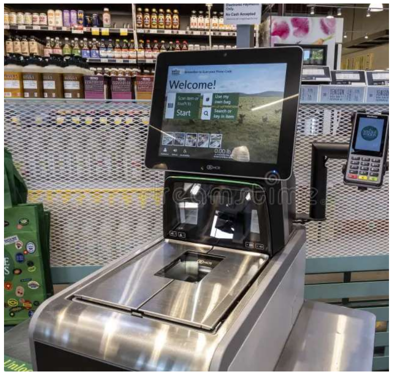


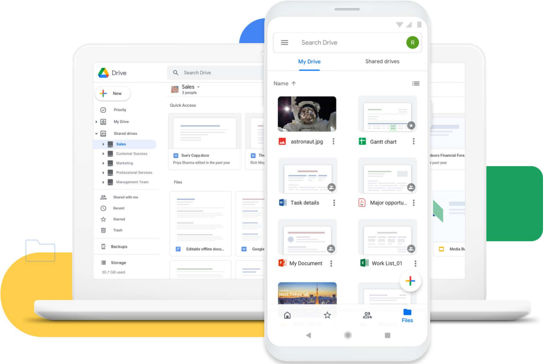


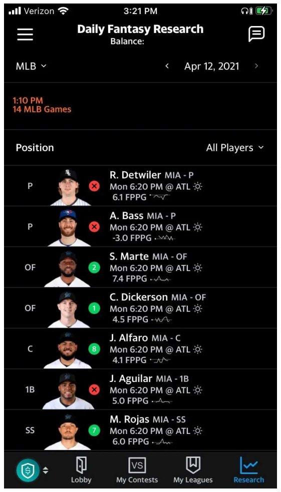


Databases Use Cases: Other Areas

- Inventories, sales, personalized coupons, purchase histories
  - Grocery Stores
- Photos and documents
  - Dropbox, iCloud, Google Drive
- Player statistics, game performances, scores, news and injury reports, projections
  - Yahoo Fantasy, ESPN
- Historical weather data, forecasts
  - Weather.com






Verizon 3:21 PM

Daily Fantasy Research
Balance:

MLB ⌄ ‹ Apr 12, 2021 ›

1:10 PM
14 MLB Games

Position All Players ⌄

P ✕ R. Detwiler MIA - P
Mon 6:20 PM @ ATL
6.1 FPPG

P ✕ A. Bass MIA - P
Mon 6:20 PM @ ATL
-3.0 FPPG

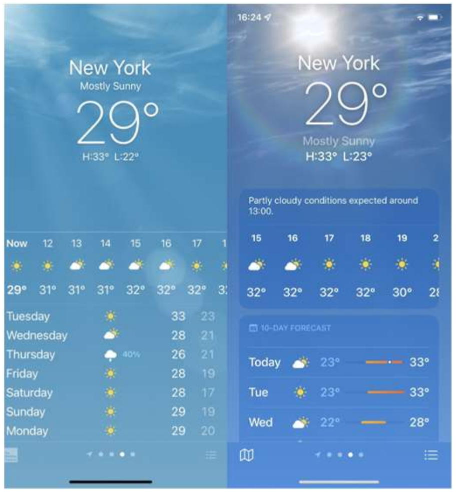
OF 2 S. Marte MIA - OF
Mon 6:20 PM @ ATL
7.4 FPPG

OF 1 C. Dickerson MIA - OF
Mon 6:20 PM @ ATL
4.5 FPPG

C 8 J. Alfaro MIA - C
Mon 6:20 PM @ ATL
4.1 FPPG

1B ✕ J. Aguilar MIA - 1B
Mon 6:20 PM @ ATL
5.0 FPPG

SS 7 M. Rojas MIA - SS
Mon 6:20 PM @ ATL
6.0 FPPG


New York
Mostly Sunny
29°
H:33° L:22°

Now 12 13 14 15 16 17
29° 31° 31° 31° 32° 32° 32°

Tuesday 33 23
Wednesday 28 21
Thursday 40% 26 21
Friday 28 19
Saturday 28 17
Sunday 29 19
Monday 29 20

16:24

New York
29°
Mostly Sunny
H:33° L:23°

Partly cloudy conditions expected around 13:00.

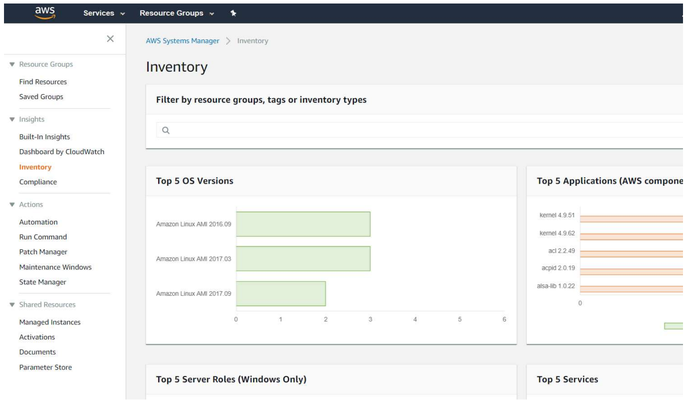
15 16 17 18 19
32° 32° 32° 32° 30°

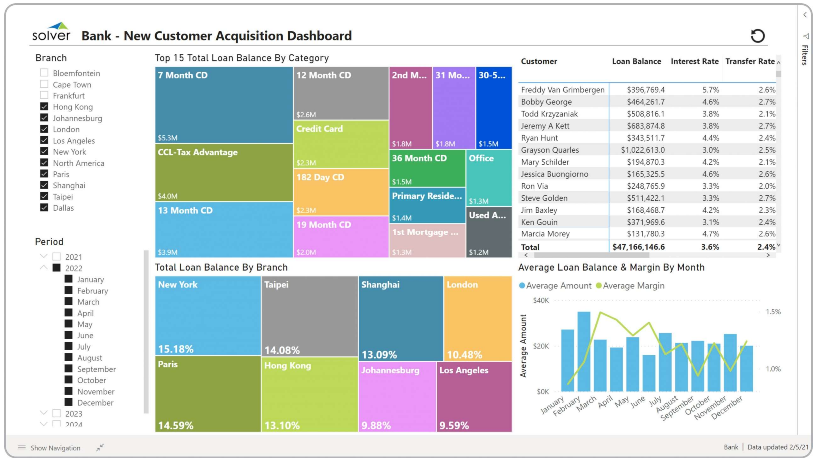
10-DAY FORECAST

Today 23° 33°
Tue 23° 33°
Wed 22° 28°

Databases Use Cases: Businesses and Institutions

- Inventory and item pricing, search history
  - Online & Retail Stores
- Employee payroll, HR notes, organization chart
  - Employers
- Storing and managing accounts, transactions and balances
  - Financial Institutions
- Customer data – name, email, phone number, address, account notes
  - Retail Stores, businesses offering product & services




solver Bank - New Customer Acquisition Dashboard

Branch

☐ Bloemfontein
☐ Cape Town
☐ Frankfurt
☑ Hong Kong
☑ Johannesburg
☑ London
☑ Los Angeles
☑ New York
☑ North America
☑ Paris
☑ Shanghai
☑ Taipei
☑ Dallas

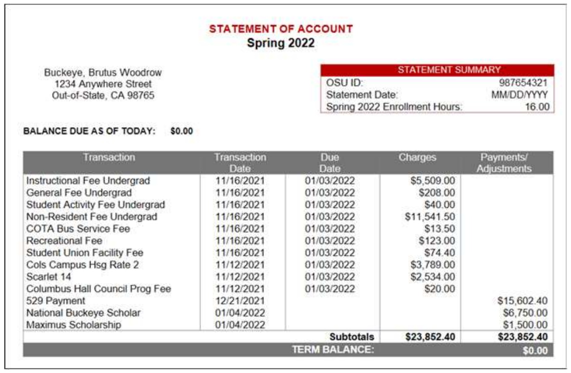
Period

☐ 2021
■ 2022
■ January
■ February
■ March
■ April
■ May
■ June
■ July
■ August
■ September
■ October
■ November
■ December
☐ 2023
☐ 2024

Customer	Loan Balance	Interest Rate	Transfer Rate
Freddy Van Grimbergen	$396,769.4	5.7%	2.6%
Bobby George	$464,261.7	4.6%	2.7%
Todd Krzyzaniak	$508,816.1	3.8%	2.1%
Jeremy A Kett	$683,874.8	3.8%	2.7%
Ryan Hunt	$343,511.7	4.4%	2.4%
Grayson Quarles	$1,022,613.0	3.0%	2.5%
Mary Schilder	$194,870.3	4.2%	2.1%
Jessica Buongiorno	$165,325.5	4.6%	2.6%
Ron Via	$248,765.9	3.3%	2.0%
Steve Golden	$511,422.1	3.3%	2.7%
Jim Baxley	$168,468.7	4.2%	2.3%
Ken Gouin	$371,969.6	3.1%	2.4%
Marcia Morey	$131,780.3	4.7%	2.6%
Total	**$47,166,146.6**	**3.6%**	**2.4%**

Databases Use Cases: Businesses and Institutions (Continued)

- Student enrollment, grades, transcripts, tuition payments, financial aid
  - Colleges, Universities
- Medical health records
  - Clinics, Hospitals
- Donations, volunteers, clients served, hours served
  - Non-profits



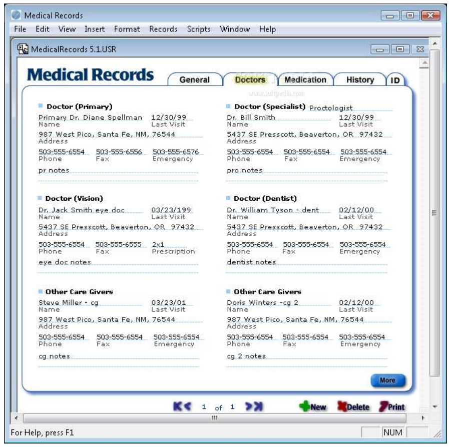
STATEMENT OF ACCOUNT
Spring 2022

Buckeye, Brutus Woodrow
1234 Anywhere Street
Out-of-State, CA 98765

STATEMENT SUMMARY	
OSU ID:	987654321
Statement Date:	MM/DD/YYYY
Spring 2022 Enrollment Hours:	16.00

BALANCE DUE AS OF TODAY: $0.00

Transaction	Transaction Date	Due Date	Charges	Payments/ Adjustments
Instructional Fee Undergrad	11/16/2021	01/03/2022	$5,509.00	
General Fee Undergrad	11/16/2021	01/03/2022	$208.00	
Student Activity Fee Undergrad	11/16/2021	01/03/2022	$40.00	
Non-Resident Fee Undergrad	11/16/2021	01/03/2022	$11,541.50	
COTA Bus Service Fee	11/16/2021	01/03/2022	$13.50	
Recreational Fee	11/16/2021	01/03/2022	$123.00	
Student Union Facility Fee	11/16/2021	01/03/2022	$74.40	
Cols Campus Hsg Rate 2	11/12/2021	01/03/2022	$3,789.00	
Scarlet 14	11/12/2021	01/03/2022	$2,534.00	
Columbus Hall Council Prog Fee	11/12/2021	01/03/2022	$20.00	
529 Payment	12/21/2021			$15,602.40
National Buckeye Scholar	01/04/2022			$6,750.00
Maximus Scholarship	01/04/2022			$1,500.00
		Subtotals	**$23,852.40**	**$23,852.40**
		TERM BALANCE:		**$0.00**



Doctor (Primary)
Primary Dr. Diane Spellman — Name; 12/30/99 — Last Visit
987 West Pico, Santa Fe, NM, 76544 — Address
503-555-6554 — Phone; 503-555-6556 — Fax; 503-555-6576 — Emergency
pr notes

Doctor (Specialist) Proctologist
Dr. Bill Smith — Name; 12/30/99 — Last Visit
5437 SE Presscott, Beaverton, OR 97432 — Address
503-555-6554 — Phone; 503-555-6554 — Fax; 503-555-6554 — Emergency
pro notes

Doctor (Vision)
Dr. Jack Smith eye doc — Name; 03/23/199 — Last Visit
5437 SE Presscott, Beaverton, OR 97432 — Address
503-555-6554 — Phone; 503-555-6555 — Fax; 2x1 — Prescription
eye doc notes

Doctor (Dentist)
Dr. William Tyson - dent — Name; 02/12/00 — Last Visit
5437 SE Presscott, Beaverton, OR 97432 — Address
503-555-6554 — Phone; 503-555-6554 — Fax; 503-555-6554 — Emergency
dentist notes

Other Care Givers
Steve Miller - cg — Name; 03/23/01 — Last Visit
987 West Pico, Santa Fe, NM, 76544 — Address
503-555-6554 — Phone; 503-555-6554 — Fax; 503-555-6554 — Emergency
cg notes

Other Care Givers
Doris Winters -cg 2 — Name; 02/12/00 — Last Visit
987 West Pico, Santa Fe, NM, 76544 — Address
503-555-6554 — Phone; 503-555-6554 — Fax; 503-555-6554 — Emergency
cg 2 notes

Popular Databases

SQL

- Microsoft SQL Server, Azure SQL Database
- Oracle
  - Acquired MySQL, an open-source database
- PostgreSQL

NoSQL

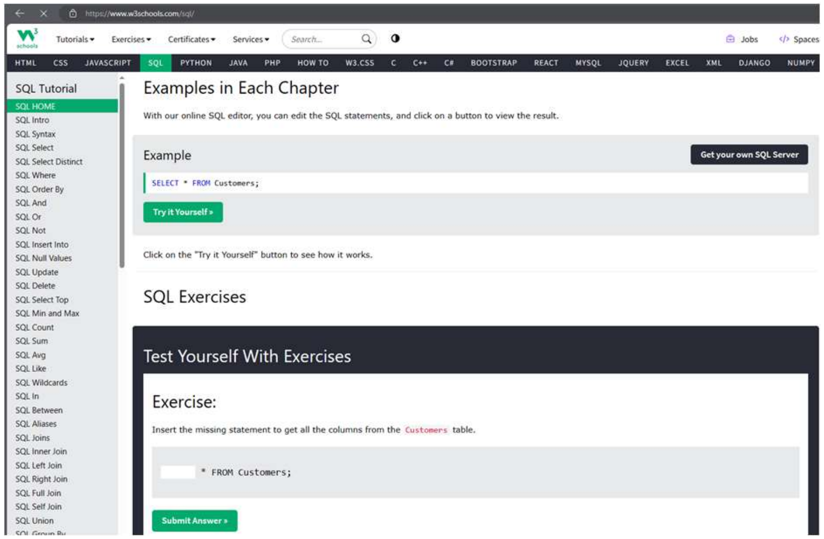
- MongoDB
- Amazon Dynamo DB
- Google Firestore

ACTIVITY

More SQL

Activity: Continue Learning SQL

1. Head to: https://www.w3schools.com/SQl
2. Click on green banner: “Start learning SQL now”
3. Continue to learn and go through the exercises



Examples in Each Chapter

With our online SQL editor, you can edit the SQL statements, and click on a button to view the result.

Example

```
SELECT * FROM Customers;
```

Click on the "Try it Yourself" button to see how it works.

SQL Exercises

Test Yourself With Exercises

Exercise:

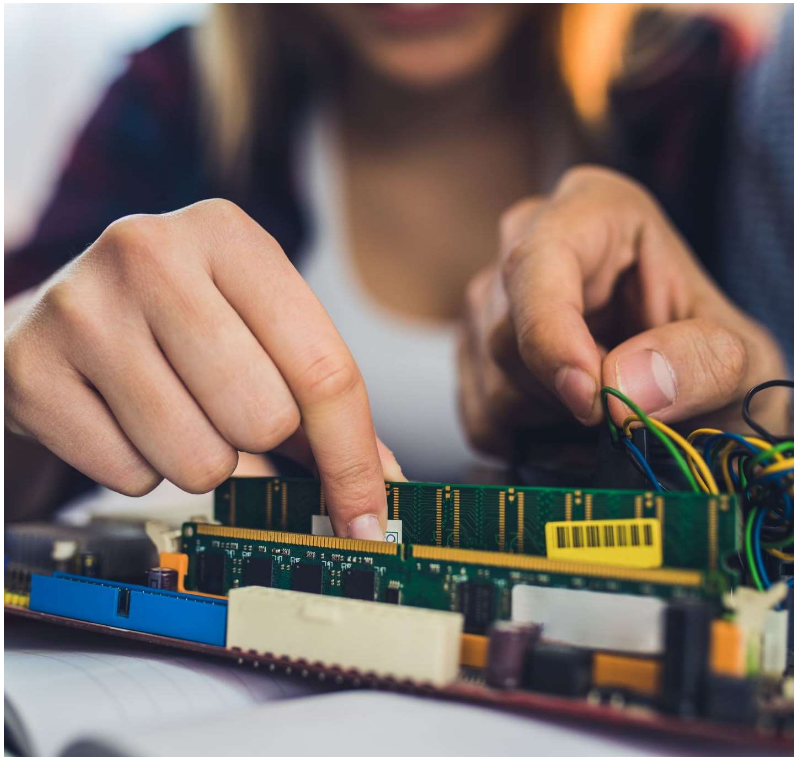
Insert the missing statement to get all the columns from the Customers table.

```
      * FROM Customers;
```

WAREHOUSE

Warehouse Activity

- 1:30-3:00pm
- CPU
  - Clean & Sort



BREAK

5 minutes