



GRAPH DATABASE

-Ms. Mazam Majmudar, Sem V

Graph Database is a type of database which stores data in form of graph. It consists of nodes, edges and relationships. Nodes represent entities and edges represent relationships between them. Relationships can be directed or undirected. Graph databases are used in various industries such as finance, healthcare, retail, etc.

Some of the popular graph databases are MongoDB 3.4, Amazon Neptune, Neo4j, OrientDB, Apache Graph, etc.

<https://neo4j.com/blog/>
<https://bitnline.net>

Relational Database was the most common way of storing data until the late 1990s. Relational Database was developed in 1970 by E. F. Codd. In relational database, data is stored in tables which have rows and columns. Every row has a primary key attribute. The operations performed on the database were inserting, updating, deleting the primary key and performing joins on multiple tables. These operations were time-consuming and costly. This made it less cost-effective. At times, such operations could even break the data integrity of the database by breaking it into pieces by de-normalizing it. As the time passed the complexity of the models grew which was terrible to handle. It was also limited by the relational database, also, it did not have fault tolerance properties.

Enter Graph Database, which had a logical approach of recreating and querying the data. Graph Database named "Neo4j" was introduced by NEO Technologies in the year 2000. Graph Database is a technology which supports distributed and fault tolerant architecture. Graph Databases handle fine-grained networks of information, providing any perspective on your data that fits your use case. It follows the ACID properties which a database should have and represents the real world and prioritises representation, discoverability and maintainability of data relationship. It looks exactly like what we draw as a physical model.

Graph Database consists of 3 main properties:

-Intuitiveness: It refers to a way to create or maintain data in logical way.

-Speed: It refers real time decision making.

-Agility: It is another measure of speed to see how quickly your code can adapt to the changing business.

There are two other properties of graph database such as performance and flexibility which make it worth to work on. The data within the database is bound to grow over the years, but these features make it possible that the performance of the graph database remains constant. Graph Database is a naturally adaptive model which uses graph structure. The main concept of the system is the graph. Graph relates the data items in the store to a collection of models and edges, where in the edges represent relationship between nodes.

Tools for Graph Database

-Ms. Wilma Patel, Sem V

TOOLS

There are various tools available in the market which helps organizations to use graph database at their tips and the graph DBMS are either open-source or proprietary. Below is the list of few graph databases:

- Neo4j:** Neo4j is a proprietary graph database, implemented in java, it stores data structured in graphs rather than usual relational based tables. It has matured user interface with intuitive interaction and built-in learning. Neo4j has the largest community of graph database enthusiasts that contributes to the Neo4j group. It is used by Walmart and many business organizations.
- Ontotext GraphDB:** Ontotext GraphDB is proprietary and comes in three versions (free, enterprise, standard) and it builds the basis for working with graph databases that utilize the W3C standards. It is a technology for data management designed to handle very large sets of structured, semi-structured or unstructured data. It helps organizations to analyze data from various sources, thus helping them with their big data and social media analytics. It is used by British broadcasting agency (BBC) for content delivery by using dynamic semantic publishing.
- ArangoDB:** ArangoDB is written in C++ and is very flexible in arranging data, it is proprietary and comes in two versions (enterprise, community), the data can be stored as key/value pairs, graphs or documents and all these data formats can be accessed by just one query language which is only possible just because it uses same single query language i.e. AQL for all the data models. The real distinct feature is its ability to combine different models in one query, this makes data less complex and representation impressive. It is used by a company named NOHO which deals in healthcare domain,

Graph databases are used by organizations to store large amounts of data in a graph format. Graph databases are used to store large amounts of data in a graph format. They are used to store large amounts of data in a graph format. Some of the main usage of graph databases are as follows:

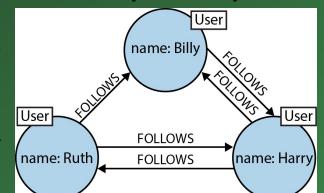
Social Media Connection: - The power of social media has changed the idiom "an apple a day keeps the doctor away" to "social media a day keeps offline world away". With the advancement in technology of social media it is easy to predict a person's behavior by understanding who she/he is connected to, where she/he checks-in, inferring social relations, finding colleagues with particular interests etc. Graphs in the Real-World, Social applications, allow organizations to gain competitive advantage by leveraging information about the connections between people. By combining discrete information about individuals and their relationships, organizations are able to manage information and predict behaviors of the users. The things have become so easy that we (end user) can also see who follows us on which platform, how he/she is related to us, which posts/stories he/she views or likes or comments and much more insights can be generated.

Stardog: It is a proprietary software, comes in three editions (personal, enterprise, developer). It provides faster insights about the big enterprise data. The latest version of stardog supports RDF (Resource Description Framework - standard model for data exchange on the Web) graph model, SPARQL (an RDF query language, i.e. a semantic query language for database, able to retrieve and manipulate data stored in RDF format) query language, gremlin graph traversal language. It immediately resolve failures because it has automatically created multiple copies of the service to make sure everything keeps running and to ensure such stability, stardog uses apache Zookeeper which has been tried and tested for this type of infrastructure. It is used by NASA, one of its division managers quoted "Stardog enables you to be able to browse through the data and all these relationships. It's a 10 to 1 savings." - Andrew Schain (program data integration manager, Exploration Systems Division).

- GraphBase:** It is a proprietary FactNexus product. It works like magic when it comes to handling complex data which needs to be arranged in a form that can be meaningful to business. It can convert any data into the most useful graphs ever seen. It has tools which arrange data into graphs and also convert that graph into Java POJOs (Plain Old Java Object) with single line of code. Further products offered are GraphBAse Agility Edition, Radiographer for Agility, Viewserver for Agility, RDF+ for Agility, GraphBase Enterprise Edition.

- Oracle NoSQL:** It is a proprietary software. Oracle NoSQL database is integrated with different oracle and open source applications to work on development and operation of big data applications that most organizations have nowadays.

In graph database each node is labeled as seen in the example i.e. User, indicating its role in the network. These nodes are then connected with relationships, which further helps in establishing the connection: From the pictorial diagram we can generate an insight that Billy follows Harry and that Harry in turn follows Billy, Ruth and Harry likewise follow each other whereas Ruth follows Billy but Billy doesn't follow Ruth back.(It is possible that Billy might be a superstar and so he doesn't follow everyone on social media, and Ruth may be just a big fan of Billy).



- Recommendation Engine:**-Effective recommendations are a prime example which generates end-user value through the applications which has suggestive and recommending capabilities. Recommendation algorithms works by identifying people, products, or services an individual or group is likely to have some interest in. Recommendation algorithms establish relationships between people and things: other people, products, services, media content whatever is relevant to the domain in which the recommendation is needed to be employed. All the expressed preferences, attitudes, ratings and reviews are correlated with those of other users in order to identify similar users and thereafter the things with which they are connected to and through all these datasets we get an effective recommendation which are suggested through different applications to the users. Rather than seeing

a tabular view of transactions, retailers can have a graph pulled together with product, customer, inventory, supplier and social sentiment data (comment, feedback, reviews etc.) into a graph database to spot patterns and make smarter and more user centric recommendations. American company Walmart has used graph database of Neo4j to build a real-time recommendations engine and many other e-commerce companies have also used Neo4j.

• **Geospatial**: - (data or associated technology which has a geographic or locational component is known as geospatial) Applications of graph databases range from calculating routes between locations such as a road or rail network, air network, or logistical routes. Geospatial applications of graph databases are particularly relevant in the areas of telecommunications, logistics, travel, timetabling, and route planning. EXAMPLE: A courier company whose domestic operation is to deliver millions of parcels to more than millions of address each day. In recent years, as a result of the rise in online shopping, the number of parcels has increased significantly. Amazon and eBay deliveries now account for more than half of the parcels routed and delivered by courier companies each day, with parcel volumes continuing to grow, and facing strong competition from other courier companies. One of the most important and time-critical components in the parcel network is the route calculation, finding the shortest delivery route, implementing route calculation etc. With the help of graph database tools, the companies can enter the parcels in the database network and that's how they are mechanically with the help of different algorithms sorted according to their destination.

Parcel routes change throughout the year, with more trucks, delivery people, and collections over the different season periods such as Diwali, end of season sales etc. The data model underlying the route calculation must allow for rapid and significant changes in short it must be flexible or elastic enough to handle future evolution.

Few other areas are also listed below where graph database is used:

◦ **Fraud detection**:- There was a past news about the Panama papers leaks in April 2017 that's where the benefits of using a graph database were realized by non-users and seen by all they used Neo4j graph DBMS. Graph database technology played a crucial role in enabling journalists to search through immense datasets, quickly making connections between individuals, institutions and tax havens and finding out faulty companies or offshore shell companies.

◦ **Identity and access management**:- Graph databases enable efficient user activity tracking and quick authorizations and asset management.

◦ **Knowledge graphs**:- Used by search engines and businesses, knowledge graphs gather information from a wide variety of sources, allowing for better digital asset management and easier information retrieval.

◦ **Network operations**:- IT company HP uses Neo4j for its own network and IT operations.

CONCLUSION

Graph databases are increasingly being used by large organizations in a variety of sectors. Many of the world's biggest banks, e-commerce companies, Telecommunication companies and many others are switching to graph database from traditional relational based database. Billy Bosworth, CEO of open-source software vendor Datastax (a cloud platform), summed up graph database as: "Essentially a way of finding connections and patterns within data, rather than just querying a data set."

References

- Graph Databases (1st edition) - NEW OPPORTUNITIES FOR CONNECTED DATA by Ian Robinson, Jim Webber & Emil Eifrem.
- <https://neo4j.com/developer/graph-database>
- Graph Database Use Cases - GOTO Conference

Neo4j

-Ms. Malini Sathyabalan &
Ms. Sajminbanu Ghumra, Sem V

Neo4j is a graph database management system developed by Neo4j, Inc. Described by its developers as an ACID-compliant transactional database with native graph storage and processing, Neo4j is the most popular graph database according to DB-Engines ranking, and the 22nd most popular database.

Neo4j is available in a GPL3-licensed open-source "community edition" and it is with online backup & high availability extensions licensed under a closed-source commercial license. Neo also licenses Neo4j with these extensions under closed-source commercial terms.

Neo4j is implemented in Java and accessible from software written in other languages using the Cypher Query Language through a transactional HTTP endpoint, or through the binary "bolt" protocol.

Applications Using Graph database Neo4j

1. WALMART:- Optimizes Customer Experience with Real-time

WALMART is unique and a family-owned business that in a little over 50 years has become the world's largest public corporation, with over 2 million employees and annual revenues of \$470 billion. WALMART has become the world's biggest retailer by understanding its customers' needs, and an important tool in achieving that has become the Neo4j database. As WALMART Software Developer Marcos Wada-the ecommerce-Brazil group explain that "Neo4j helps us to understand our online shoppers' behavior and the relationship between our customers and products, providing a perfect tool for real-time product recommendations."

The Challenge: Now a days, person buying goods at store being of the opinion that is the main benefit of it. The goods made for a person recommendations and also did by consumers' suggestions. But to get it done, this has need of facts of products that can make connection masses of complex one, who gives money and product facts to make profit. As Marcos told for: "A relation knowledge-based was not pleasing our requirements about doing a play and

the Army's aging mainframe-based system as the volume of available data was increasing and many of the historical data sources were changing. It was obvious that a system with more flexibility would offer greater performance and the ability to add in new dimensions for more insights and richer analysis.

The Solution: The Army recognized the need to modernize its core tracking system. Working with CALIBRE, an employee-owned management consulting and IT Solutions Company, that delivers remarkable solutions to defense, federal and commercial clients, the U.S. Army is now employing Neo4j as a major part of their solution for providing greater visibility into the total costs of owning a system.

5. GRAPHILEON

Challenge: LinkedIn as a social network for professionals is geared mostly towards English-speaking international users with advanced careers looking to further expand their networks globally. But the company noticed a large, untapped market: young professionals in China who were new to the workforce. To reach this demographic, the company launched Chitu which seeks to engage job seekers through a game-like user interface that is available on both desktop and mobile devices. Not unlike LinkedIn, the tool provides users with the opportunities to grow their networks via connections and direct messaging, but also provides opportunities for in-person meetings and networking events.

The Solution: Neo4j was the missing piece for Chitu. The engineering team immediately noticed the difference in Neo4j's processing speed, especially related to MySQL, and ease-in programming. Queries can now be performed in record time, and the company was able to launch the first version of its application in only four months.

3. HP

HP's Converged Infrastructure brings together critical technology enablers across servers, storage, management software, networking, power and cooling, security and services into a defined architecture that enables real-time alignment between IT and business objectives. HP with its Converged Infrastructure architecture continues to expand and deliver capabilities that focus on marketplace demand, offering clients choice and its value.

6. TELIA

Telia Zone is a platform that allows consumers to experience superior digital solutions at home, simplifying everyday life by making time at home more enjoyable. The company has gained a lot of press for launching both an open developer API and a consumer proposition in record time. Technical challenges, performance requirements and the strive to implement more advanced features has required the team to develop and implement the backend with the latest technologies and methods including Neo4j Causal Clustering and Kubernetes..

Reference: - <https://neo4j.com/customers/>
<https://en.wikipedia.org/wiki/Neo4j>

SEMINARS

Workshop on iOS

Faculty of Computer Technology, GLS University has organized two-day workshop on iOS(Xcode). The workshop was organized on 5-6th Jul 2019. Mr. Prashant Dhabhi and Mr.Vishal Kalola Sr. iOS developer from Moweb Technologies Pvt. Ltd., Ahmedabad has conducted the workshop for MCA SEM-Students.

Total of 60 MCA students has attended the workshop. During this workshop both the speakers had shared their views & experience on working of Xcode. Students learned What "The iOS Technology" means and how it relates to mobile applications concepts. The basic usage of the iOS environment for creating their own embedded, layout and views by texting through phone and many more. The workshop was coordinated by Dr. Zakiya Malek & Dr. Devarshi Mehta.



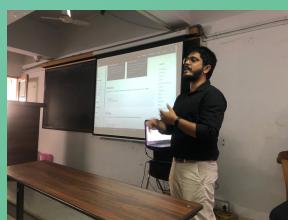
Workshop on ReactJS

On sep 17, 2019, workshop on ReactJS was organized by the Faculty of Computer Technology for the students of Semester III. The resource person was Mr. Dinesh from Rapidos Solutions. He is a Senior Developer with 7+ years of Experience. He explained how this simple and easy to learn rich library can be used to develop high performances applications. Full day was utilized where in students were benefitted with a highly demanding technology. Lastly FCT also wants to thank Mr. Deep Shah - Alumni @ FCT to help in contacting the resource person for the day and also to provide the support on day for the hands-on.



Seminar on "ReactNative and Flutter"

FCT organized a session on the leading technology of "Cross Platform App Development" on 22nd November, 2019. The resource person for the same were Mr. Mihir- Senior Developer and Mr. Dhruv,- Senior Developer from Elsner Technologies Pvt. Ltd. The seminar was coordinated at GLS-ICT by Prof. Rupal Shah and Dr. Devarshi Mehta. The seminar has covered the topics like Benefits of using cross platform technologies, Basics of React Native and Flutter, Why we should go for Cross Platform Developments, Market Insights, Big companies using Cross Platforms, Live Q & A. The session ended with a great interaction and discussion between students and the resource person.



Seminar on Emphasizing the importance of security

One single vulnerability is all an attacker needs. "Emphasizing the importance of security", Mr. Jaimin Gohel conducted a seminar on 16th October 2019 at FCT, for the students of MCA Programme. Mr. Gohel is a manager-Professional Services at NetSquare and has worked on various projects of vulnerability assessment and penetration testing. He briefed the students about the various aspects of security to be considered while developing an application. He also demonstrated various ways in which different types of attacks can occur and also means to keep your system safe.

Seminar on Overseas Work Culture

Faculty of Computer Technology, MCA Programme organized a seminar on Overseas-Work Culture on 26th July 2019 for the students of MCA (V Sem). The seminar was conducted by Ms. Rachna Naveen from California, USA. She has been affiliated with the IT industry for 20 years. She started her career as Oracle Developer, then became Technical Lead and later ETL Manager. Her current job title is Senior Data Engineer-Business Intelligence Lead and she is working with AWS Redshift, Big Data, Google Analytics and Periscope.

Rachna discussed the current IT industry work opportunities at Overseas. She also informed the students on how to work with global company, understand company's culture – Especially work-life balance.. The students had a great time interacting with Ms. Rachna.

EVENTS

Code Warfare 2.0 Python Coding Half Marathon

For students, Information Technology programming is an essential skill; hence it is the duty of academia to train the students in that area such that they survive in a competitive and ever-changing IT industry. We at FCT, promote the programming culture in the students in every possible way by organizing various competitions for the students. On Friday 13th September 2019 Faculty of Computer Applications and Information Technology along with Faculty of Computer Technology organized "Code Warfare 2.0"- Python Coding Half Marathon for the students of MSc (IT), MCA, iMSc(IT) and PGDCA. A total of 55 teams each consisting of 2 members participated in this half marathon. The objective was to groom the students in teamwork, logical skill building and increasing their programming knowledge by having healthy competition. The event was coordinated by Dr. Zakiya Malek, Prof. Rupal Shah, Prof. Vishal Narvani and Prof. Dinesh Kalal. The winners of the event in FCT were Mr. Jain Ronak and Ms. Agarwal Vanshikawhile Mr. Dhada Irfan and Mr. Panchal Parth were runner-ups.



Blood Donation Camp

We should look to and have our focus firmly fixed upon the saviour at all times and in all places. Being a great person nowadays is not at all a big deal but being a good person requires lots and lots of effort.

To enlighten the brightness of humanity, FCT in association with Red Cross Society organized a "Blood Donation Camp" on 17 September 2019, co-ordinated by Prof. Zakiya Malek. In this camp, approx. 84 students along with faculty members showed their keen interest in donating their blood and saving lives of others, out of which 75 succeed as 26 were rejected due to reasons like low B.P., anaemic, underweight etc.



Thalassemia Camp

Faculty of Computer Technology & Faculty of Computer Applications & Information Technology has organized "Thalassemia / Sickle Cell Prevention Program" with the Indian Red Cross Society on 5th September, 2019 coordinated by Prof. Zakiya Malek.

The students were introduced to the problems caused due to thalassemia and its causes. In this program the counseling and screening test to detect Thalassemia minor among all the MCA and MSc(IT) students were done(total approx. 70). After test, family counseling of Thalassemia minor students was also carried out.



All the students – (school as well as FCT) participated with a great zeal and enthusiasm. The day proved beneficiary to both the sides: the giver of the knowledge as well as the taker of the knowledge. Students of FCT actually felt, realized and experienced the quotation by Dalai Lama - "Share your knowledge, It's a way to achieve immortality.

Industrial Tour

AMUL CHOCOLATE FACTORY AND AMUL DAIRY ANAND, GUJARAT.

Faculty of Computer Technology, GLS University organized an industrial tour for MCA students at Amul chocolate factory and the Amul dairy located at Anand, Gujarat on 09.7.2019 . Total 88 students took active participation with two faculty members (Dr. Zakiya Malek and Prof. Rupal Shah) . These two units of Amul mainly focuses on the preparation of chocolates, sweets and milk products respectively.

This trip was highly useful for the students in terms of practical knowledge about the working of the factory and the dairy and will also be helpful for students to see the scope in the automation sector and to work in the field of automation and to find more efficient ways to do a manual job through automation and create opportunities in such industries.



VISITS

Social Visit

"Knowledge is like money: to be of value it must circulate, and in circulating it can increase in quantity and, hopefully, in value."

-Louis L'Amour

Faculty of Computer Technology, GLS University organized a "Computer Awareness Program "at the Municipality school at Saragwada village in Dholka district. The team of 60 students of FCT under the guidance of Dr. Zakiya Malek and Prof. Rupal Shah visited the school on 26th September 2019 and imparted the knowledge of Computers to the school students of standard 5th, 6th, 7th, and 8th. Approximately 160 school students took advantage of the program.

The full-day session started by attending the daily prayers and assembly of the school. "Computer Literacy Video" prepared by the FCT students was showed to the school students. A small MCQ test was arranged based on the video shown. The top two scorers in the test from each standard were rewarded with gifts.

After this session, all the FCT students got distributed amongst all the classes and conducted a session where they showed the basic usage of computers and demonstrated the same on their laptops. Some of the FCT students evaluated the MCQ test papers and few distributed the kit containing chocolates and school stationery like pen, pencil, eraser, sharpener, scale and colors to the primary as well as secondary class students of the school.

ACHIEVEMENTS

Faculty Achievement:

Prof. Zakiyabu S. Malek has been awarded Best Research Paper in Computer Science & Applications for the paper titled "User Behavior Based Intrusion Detection Using Statistical Techniques" on 19 th January 2020 at I M Nanavati Research awards-2020 GLS University.

Dr. Zakiyabu S. Malek scored the Second Position in the Best Doctoral Thesis Category. Title of thesis: "A Model for Behavior based Multilayered Intrusion Detection System" on 19 th January 2020 at I M Nanavati Research awards-2020 GLS University.



Student Achievement

• Best Dissertation/ Project Award:

Students of Faculty of Computer Technology, Mr. Ankit Tiwari, Mr. Paresh Baraiya and Mr. Prakash Hingu secured first position and Ms. Grishma Thakkar and Mr. Mitul Vaghasiya secured third position under the Best Post-Graduate Dissertation/Project category award on "Fourth I. M. Nanavati Research Day Celebration" at GLS University on 19th January, 2020. The title of the projects were "Live Stock Insurance" and "Volunteer Overseas" respectively.



Placement Details

Placement process at Faculty of Computer Technology is a privilege for students and refers to the process of connecting the students and industry to achieve the success in post graduate career. The institute offers a significant placement record every year. Students are groomed for their industry training by organizing pre-placement activities, seminars, technical test series and mock interviews at the institute. Around 85% provisional placement achieved every year. This year almost 100 IT companies are invited at FCT campus for placement. Students got provisional placement in many reputed companies due to endless efforts of the placement committee members and student volunteers.

Some of the companies where students are placed:

4C Info Engineering	Lodestone Software Service Pvt. Ltd.
Aspire Software Solutions	Magneto IT Solutions Pvt. Ltd.
Biztech IT Consultancy Pvt Ltd	NeoGen InfoTech
Creole Studios	ProT Systems
Cybercom Creation	TatvaSoft
Elsner Technologies	The One Technologies
Gateway Technolabs Pvt Ltd	Third Rock Techkno
Hyperlink Infosystem	XMPlify
iTechNotion IT Solutions LLP	Yudiz Solutions Pvt Ltd
Knovos India Pvt Ltd	ZealousWeb

Shining Stars of GLSICT

Sem- III



**MR RONAK M.
JAIN
745**



**Ms. JEEL P.
JAIN
722**



**Ms PRACHI R.
KAKAIYA
703**



**Mr VARUN K.
RAVAL
695**



**Mr HAMZA N.
SAIYED
694**

Sem- V



**Mr.
CHAMPAKKUMAR
P.
628**



**Mr.
KEVIN C. SHAH
628**



**Ms. SAJMINBANU
GHUMRA
614**



**Ms. DHRUVI C.
PARMAR
603**



**Ms. DIVYA A.
SONAR
603**

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